# COAL

McGRAW-HILL PUBLICATION

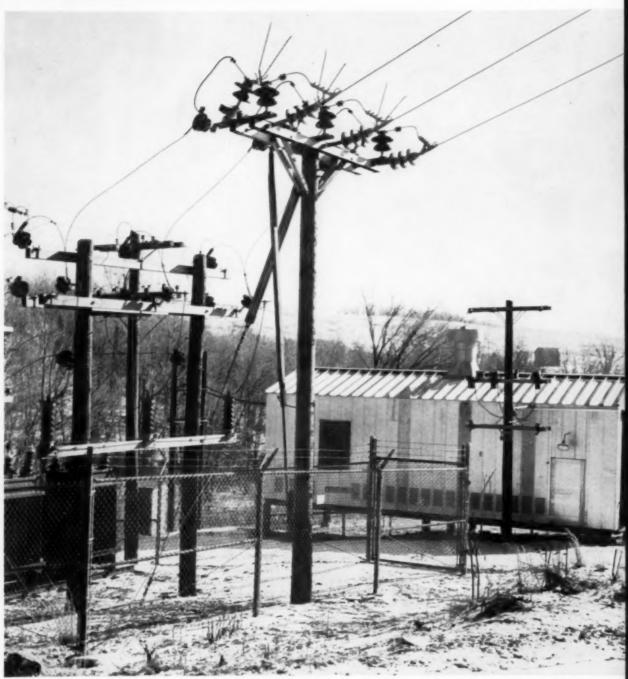
### AUGUST, 1958

UMWA Hospital Program .p 72

Integrating Multiple Fans . p

Safety at Republic Mine . . p 100

PRICE \$1



Bethlehem's AC Power System ... p 78

Bethlehem's AC F

Constant and combined research at the MSA and Edison Laboratories determines the quality components of Edison Electric Cap Lamps and charging equipment. This team helps to improve battery performance, increase headpiece light output, and develop efficient charging methods.

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COAL AGE · August, 1958





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SURFACE MOISTURE OF DEWATERED COAL IS —

SOLIDS LOSS THROUGH THE SCREEN LINER IS —

1
1
1

1/4 HP?	1
1 HP?	-
2 HP?	

5%	1
7%	-
10%	-
20%	

	-
2%	1
10%	1
20%	1
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### This Month in

AUGUST 1958

# COAL

#### Features This Month: Editorial The Welfare Fund Medical Program Bethlehem's Designs for Distributing AC Power Integrating Multiple Fans Better Boom Support for Big Shovels Constant Accent on Safety Electronic Conveyor Control Better Materials for Today's Strip Mines Open Pit Mining Association meeting Mining Progress and Safety р 114 Mine Inspectors' Institute of America New Designs in Mining Equipment n 122 West Virginia Coal Mining Institute Personnel Selection, Safety, Methods p 126 Rocky Mountain Coal Mining Institute Mining Society of Nova Scotia p 132 Coal mining, utilization and safety Departments This Month: p 26 Coal Commentator p 11 News Roundup Foremen's Forum p 136 Operating Ideas p 140

#### Labor Relations

The Welfare-Fund Medical Program ... p 72 Progress, Problems and Prospects W. A. Raleigh Jr., Associate Editor, Coal Age

Equipment Developments p 144

Mutual benefits have accrued to labor and management in the Welfare-Fund medical program. This provides a nationwide system of top-quality, reasonable-cost, cradle-to-grave medical service for miners and their families. Included in the system: a 250-mi chain of 10 modern hospitals in Kentucky, West Virginia and Virginia; 10 area medical offices in 26 states and Alaska. Labor has benefitted directly through medical aid which totaled over \$353 million during the 11-yr period ending June 30, 1957. Management's payoff has been in conserving skilled labor and in improved on-the-job attitudes. Both share in an upgrading of industry stature in the national community.

Featured: "The Staff Behind the Job"; a picture spread highlighting "top-quality care at reasonable cost."



#### ► Electric Power

Bethlehem's Designs for Distributing
AC Power p 78

Daniel Jackson Jr., Assistant Editor, Coal Age

Purchased power is delivered to Mine No. 60 at 23 kv and distributed in four distribution circuits at 2.3 kv. Separate metering points eliminate need for additional company-maintained power lines on the property. Power factor correction is provided by capacitors at main load centers and at main switchgear. Interior and outdoor lighting also is carefully designed. Conversion units, AC to DC, are located both on the surface and underground. Special suspension systems are employed to support borehole cables.

Highlights—How to calculate capacitor requirements for power-factor correction; line drawings of outstanding features of power system at Mine No. 60.

#### ► Ventilation

Integrating Multiple Fans ...... p 88

D. S. Kingery, Chief, Ventilation Section, U. S. Bureau of Mines, Pittsburgh, Pa.

Efforts are now being made to study the problems and hazards associated with multiple fans at individual (Continued on p 7)

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#### This Month in Coal Age-Cont'd

mines. An interruption in service of one fan may adversely affect ventilation throughout the mine. At mine employing multiple-fan systems, management should determine the effects of such fan stoppages, and if necessary, redesign their systems to eliminate possible hazards.

Sidelight—Illustrations of how fan stoppages in multiple-fan systems affect mine-air distribution.



### ► Stripping

Better Boom Support for Big Shovels p 96

Safer, simpler methods of supporting booms on big stripping shovels have been developed at Hanna Coal Co. in cooperation with research engineers at Lehigh University. Life of boom supports has been more than doubled by replacing conventional wire rope with strands and changing the method of attachment. In the new system, four strands are fastened individually between boom and gantry. Thus if one should fail, the other three would prevent the boom from falling. The development of the new system is another outgrowth of Hanna Coal's research activities.

Added Feature—Specifications and maintenance procedures of the support strands.

### ► Safety

Constant Accent on Safety ...... p 100

From Nov. 1, 1955, through Mar. 31, 1958, employees at Republic Steel's coal mine at Elkhorn City, Ky., have worked 1,007,640 man-hours without a lost-time accident. Strict adherence to state and federal statutes and company safety directives are among the main reasons for the achievement, according to J. L. Coyer, mine superintendent. Monthly safety meetings among supervisors and weekly meetings in working areas with employees promote the cause of safety.

(Continued on p 9:

### This Month in COAL

PLATEAU IN PRODUCTION?—The end of the vacation found bituminous coal again operating at between 8 and 9 million tons per week, the level it achieved in the weeks immediately before the vacation shutdown. That pace bids fair to continue through August, with developments in business after that determining whether bituminous will rise, fall or stay on the plateau.

The anthracite pattern corresponds almost exactly with that in bituminous, with both winding up July slightly over 20% under 1957.

TURN IN THE FOURTH?—One reason for anticipating a production plateau in the third quarter is the continued low rate in steel production, in turn reflecting low auto sales, these in their turn reflecting acontinued low rate in consumer purchases. Even though developments in several other directions—housing, construction, power production and the like—continue favorable, it cannot be concluded that the recession is beginning to come to an end until the steel rate hits 75% on a rising curve. The fourth quarter now appears to be the time when that might happen, though developments in the Near East might advance the date.

AGAIN DEFERRED—As Congress again approached adjournment, the oft-repeated pattern of action on measures advocated by coal was still much in evidence. In other words, practically all the relief coal has crusaded for was voted down or pushed aside. The list includes general and specific tax relief (depletion rates, etc.), revision in the reciprocal-trade act to provide more protection against dumping of imported competitive fuels, and new legislation to assist the railroads and thus reduce the pressure to raise rates. However, coal continued to benefit from oil-import restrictions, and also was relieved at long last of the burden of the 4c-per-ton transportation tax.

SECOND ON LINE—Scheduled operation of the second 225,000-kw generating unit at the Kammer power plant, near Wheeling, W. Va., helped strengthen the power output picture, which will get an extra lift when the third unit goes on line in December. The station supplies juice for the new Clarington (Ohio) aluminum reduction plant of the Ormet Corp., and receives its coal (eventually around 2 million tons a year) from the new Ireland mine. In addition to firming up the already bright power picture, the plant eventually will use char from an adjacent plant. Construction of this char plant is expected to start before the end of the year. Completion will mark another forward step for coal into the chemical industry.

UPWARD AGAIN—After some months of reduced levels or deferment of capital expenditures, July and early August were bringing evidence that the rate is trending upward again. The major interest, of course, is in continuous mining equipment underground, in drills in stripping, in transportation equipment for both industries, and in preparation, not only for existing operations but for new properties. Anticipation of the higher production levels that will be required in the future, as well as the traditional pressure for cost and quality, are factors in the rise.

COAL AGE . August. 1958



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"Properly tooled" to many Lee-Norse operators means using famous Firthite Blue Bits . . . because of their proved-in-the-mine effectiveness and new design techniques including self gaging shanks and "beefed-up" carbide support areas.

There is a Firthite Blue Bit for your mining condition. Consult the table at right or your Firth Sterling mining tool engineer.

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C-7-S-4 CD-7 CM-7	Heavy	Large Quanti- ties Sulphur Balls, Rock, Rolls, etc.	1/2 x 1

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This Month in Coal Age-Cont'd

Bonus—"Minutes" of one of the monthly safety conferences among supervisors, including safety suggestions from the mine staff.

### **▶** Transportation

Electronic Conveyor Controls ...... p 106

Automatic electronic coal-proportioning system at Jones & Laughlin preparation plant blends individual streams of coal from Vesta and Shannopin mines into uniform feed for making quality coking coal. The Shannopin conveyor is electronically controlled to feed a specified amount of coal into the stream from Vesta mines, depending upon the loading of the Vesta conveyor.

New Idea—How control elements convert speed and loading of one conveyor into control intelligence for a second conveyor.

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# This Month in Mining Practice

BETTER BOLTING—Good anchorage and proper tensioning are essential to maximum holding power in roof-bolting. From the tensioning standpoint, results to date now make it clear that visual indicators, now available in two major types, definitely improve bolting results by insuring better tensioning, partly because they are more accurate and thus force modifications in bolting equipment to correspond. Forecast: accelerated use of visual indicators in bolting mine roof.

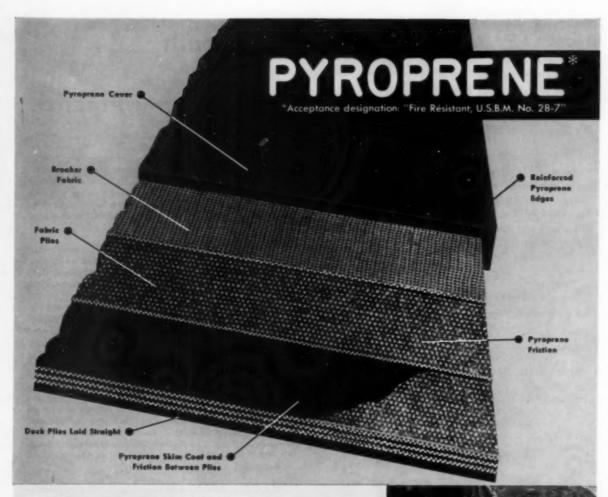
SLOW GOING—Several issues back it was noted that plastic-jacketed trailing cables looked promising and were destined for increasing use. Additional field reports since that time indicate that the forecast was optimistic. It still is expected that plastic will find a place, but a number of problems remain to be solved. Meantime, the performance of the old-reliable rubber types improve steadily, thus giving the mining user more value for his dollar.

HEAT TOO—Heat is the normal accompaniment of the operation of any tire, though it has not been an especially troublesome factor with the truck loads and speeds of the past. Now that speeds are up and trucks and trailers are being designed up to ratings of 75 tons or more, heating in operation has become a real problem in some instances—and a more significant factor at most operations. The answers include special tire materials and constructions and more care in operation and maintenance.

MAN LOCATOR—A major function of a good communication system is keeping track of key personnel, whether they be mechanics or managers. The regular telephone or radio system is the mainstay, but supplemented facilities conceivably could help. Among these is the peg board developed at the Pueblo works of Colorado Fuel & Iron. Locations where the man might be are painted on the board or boards with peg holes opposite. When the man goes in he puts a peg or pegs in the proper holes, facilitating the finding operation.

DEEP FROM STRIP—Augering from strip pits has been accompanied by its own set of problems, including the protection of crews from highwall slides and falls. Mining with the usual underground units, however, such as the continuous miner, brings in a few additional difficulties. One is the extra width of place in relation to the shape the overburden has been left in by shooting, or the shape it naturally may be in because of its shallowness or nearness to the outcrop. Those using underground units in this fashion are finding that the roof and its support must be given extra consideration.

REMOVAL FROM HAZARD—Automatic interruption of the current to a face unit in case of ground is of course a worthwhile objective. However, it creates a few new problems. One is removing the unit if development of a hazardous condition is imminent—a problem that has already been encountered in a few instances. As a result, it is being suggested that the automatic systems include some provision to permit moving the machine when it is reasonably safe to do so.



### What happens if fire penetrates to the carcass of a conveyor belt?

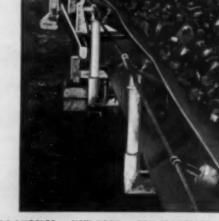
It goes out if it's a Hamilton Pyroprene belt. Fire just can't find fuel to feed on in this U.S.B.M.-accepted belt because every element is "Pyroprene Protected". The cover is all Pyroprene. The fabric plies and the breaker fabric are completely encased with 100% Pyroprene compound before the belt is built.

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Pyroprene belting offers exceptional durability and strength. The cover will give maximum resistance to cuts, tears, gouging and abrasion; reinforced edges protect carcass at critical wear point. Breaker fabric acts as cushion for impact. Fabric plies are strength members. Skim coats increase adhesion and prevent ply separation. Write Dept. MI-105.



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### The Coal Commentator

#### Big Future

How long the old conventional belt conveyor framework will remain a significant factor in coal mining is of course still a question. But the rapid use of the rope type and the increasing number of tricks proposed with it mean that it will be giving the conventional unit more and more competition as time goes on.

Surface use is the next field for the rope type, which is inherently less costly because of less metal and fabrication. Proposals for surface use include operation over suspension bridges, handling timber and construction materials, and others—and the end probably is not yet.

Conclusion: Another coal-developed item with a big future.

#### Well Done

Several recent events refocus attention on the fact that manpower, particularly management and engineering, continues as one of coal's major concerns. They include the announcement of scholarships by a number of mining organizations, 1958 Old Timers' Awards to outstanding students, and the retirement of M. D. Cooper, director, mining engineering education, National Coal Association.

Mr. Cooper's contributions to coal go back many years and have included both operation with the Hillman Coal & Coke Co., and specialized service with National Coal. Its effectiveness may be judged from the conclusion that the number of scholarships previously referred to would not be as big had it not been for his efforts.

A hearty "Well done," therefore, naturally goes with all good wishes for the future to Mr. Cooper.

#### No Fluke

The fact that coal can be mined with much less than the average number of injuries and fatalities is proved once again by experience in Illinois, which shows that such records are no fluke.

Your commentator had the pleasure of reporting on a previous Illinois record in 1956, and it is a privilege to note once again that the state seems to have acquired the habit and consequently has bettered its old record by a wide margin. In the period Feb. 21-June 11, 1958, Illinois produced 10 million tons without a fatality—the best mark since records were first kept in 1882.

May was the record month in Illinois, with only 31 accidents causing the loss of more than one day of work. Tons per injury (all nonfatal) totalled 102,439 in that month. Among the reasons credited for the improvement in the Illinois mine-safety picture was improvement of the state mine law, with particular attention to ventilation, rock dusting, timbering, fire protection, and coal-shooting and breaking methods.

The Illinois tonnage, of course, includes a substantial percentage from stripping, but even when this is given due weight the Illinois record stands without major equal. To quote from the Coal Commentator of December, 1956:

"Congratulations to management, men and officials in Illinois are clearly in order for a truly significant safety achievement." And to repeat also, "the Illinois record warrants careful study by producers and safety authorities in other regions" to the end that maximum progress be made in reducing the number of injuries and fatalities to the absolute minimum.

#### Half Century

Fifty years takes one back to 1905 and to the formation of the Wilmot Engineering Co., one of the distinguished additions to the Half-Century Service Club in 1958.

Still headed by a Wilmot, the organization specialized in preparation and underground equipment and services for both the anthracite and bituminous industries, with natural emphasis on anthracite in view of its location in the heart of the Middle Field. Whether drag chain or heavy-media washer, the Wilmot name ranks high in the list of those respected by the coal-operating fraternity for product quality and service.

Starting on another half century, the Wilmot organization takes with it a bow for its past performance, which undoubtedly has set the pattern for its future contributions.

### Worth Doing

Good maintenance has perforce been accepted as a key factor in efficient, low-cost mining. Having been accepted, the problem then becomes one of getting it. One way is exchange of ideas. This was the objective of the Mining Electro-Mechanical Maintenance Association organized a few years ago. in Pennsylvania.

There is no question but what the organization has contributed significantly to better maintenance in the areas in which it has been active, primarily the East and Near South. An effort is now being made to convert the organization into a national one taking in mines in other coal fields, as well as other types of mining in addition.

The rewards of achieving national status certainly are well worth the effort, and it is to be hoped that the date of that achievement will be soon.





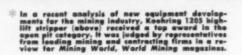
### Digging height ... 42'-10" Dumping height ... 31'-5" (40' boom at 45° angle)

Look at the work range of this big stripping shovel! It's the high-lift 1205 — a recent addition to Koehring® heavyduty line. When equipped with 3-yard dipper on 40-foot boom, it has 42-foot-10inch cutting height at 45° boom angle and dumps at a height of 31-feet-5-inches. That's not all—

#### Higher with 50' boom

When extra reach is needed, Koehring high-lift 1205 handles a 2½-y-yard dipper on 50-foot boom. This gives you 51-foot-4-inch cutting height — and a 40-foot-10-inch dumping height, at 45° boom angle. (For heaviest digging a standard 1205 has 3-yard shovel dipper on 30-foot boom.)

The 1205's power, strength, and load-stability also pay off in extra work capacity on dragline stripping and clamshell stockpiling. Depending on weight of materials, it handles 3 to 4-yard dragline or clamshell buckets on 60 to 170-foot boom. As a lift crane, it has 95-ton capacity (based on 75% rating). For all its size and capacity, the high-lift 1205 is exceptionally easy-operating. 90% power-assist on main drum clutches gives light lever pull, sensitive "feel" of load—helps get more work done with every attachment. Get complete details from Koehring distributor today.



Below is another big Koehring stripper worth looking into — the heavy-duty 805. As a dragline or clumshell it hundles 2 to 3-yard buckets on wide work radius. Boom lengths: 50 to 150 feet. Converts to 52-ton crane for heavy lifting — and 2yard shovel (with 25-foot boom) for heavy digging.





K841

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"A drop in the bucket!" The constructions shown here by Tom Weichel, Okonite's chief mining engineer, are just a random sampling of the cables that Okonite has developed for mining operations. More

than likely, Okonite has available right now the exact cable you need—in terms of toughness, flexibility, capacity, resistance to oils, acids, alkalies, mine water and high heat. If not...we know how to build it!

### Here's how we add value to your cable dollar

Behind these cable constructions are service records that prove the extra long life of Okocord portable cables in the face of continual highspeed reeling, rock falls, run-overs and constant dragging over mine floors and around sharp corners.

Longer cable life means lower operating costs...reduction of costly work stoppages...greater utilization of expensive equipment. Truly, Okocord represents money in the pocket for any mine operator.

Here's how Okonite assures maximum value for your cable dollar:

- By the use of materials developed in 80 years of making the finest cables.
- By constant research to find even better materials and constructions.
- By intimate, first-hand knowledge of mining problems and conditions.
- By self-imposed standards for manufacturing and testing that are more exacting than the industry requires.

There is an Okonite quality cable for your shovels, drills, shuttle cars, continuous miners and other equipment. There are Okonite specialists ready and willing to help you in the planning or installation stages. And there is a brand new booklet full of valuable hints on picking the right cable constructions for your all-important power or control circuits. Write for free Bulletin CA-1117—"How to choose insulated cable"—to The Okonite Co., Passaic, N. J.



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- mine more coal, because you can run longer without shutdowns for inspection and maintenance.
- cut operating costs, because parts last longer.
- simplify lubrication, because you can use 740A-EP in place of two or three specialized lubricants.

- use less grease, because 740A-EP stays put.
- increase safety, because you get no excessive drippage. There's no need to worry about fire hazards and dangerous footing caused by gear oil slicks.

These days, when every miner is looking for ways to boost tonnage, but not his costs, a product like 740A-EP is especially interesting. Want to know the rest of the story? Call in your Sun man, or write to Dept. CA-7.



In Canada: Sun Oil Company Limited, Toronto and Montreel.

### INDUSTRIAL PRODUCTS DEPARTMENT

### SUN OIL COMPANY PHILADELPHIA 3, PA.

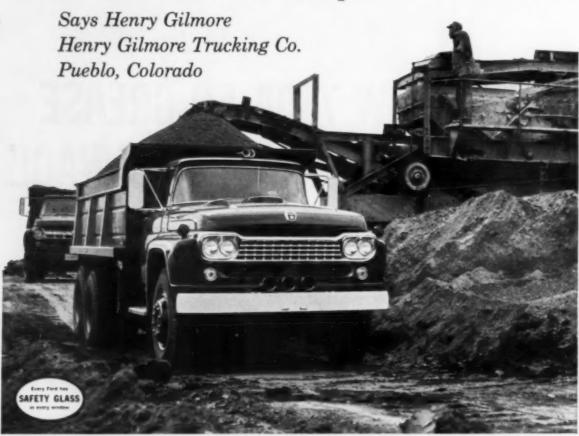
#### Sun Offices in coal country

City	Telephone
Brownsville, Pa	State 5-7400
Chicago, III	Harrison 7-2562
Cincinneti, Ohio	Garfield 3930
Columbus, Ohio	Broadway 4-1158

City	Telephone
Greensburg, Pa	Greensburg 5600
Huntington, West Va	Huntington 9158
Indianapolis, Ind	Humbolt 1354
Johnstown, Pa	ohnstown 33-2111
Louisville, Ky	Clay 5526

City	Telephone
Pittsburgh, Pa	Sterling 1-1252
St. Louis, Mo	Chestnut 1-2191
Wheeling, West Va	Warwood 148
Youngstown Ohio	Studion 8-5081

### "FOR ENDURANCE, I KNOW YOU



### "We've run our Ford trucks over 100,000 miles and have never had any major repairs!

"We've tried all kinds of trucks and our Ford tandems are the best we've ever owned. Our 24 Fords are T-750's and T-800's with 332-cu. in. Heavy Duty V-8 engines. We run 'em an average of 100,000 miles before trading, and never touch the engines except for minor tune-ups.

"Our '58 T-800's have 34,000-lb. tandem axles and carry 10 yards of gravel or hot mix. During the winter months, we hauled in a 30,000-ton mountain of gravel to feed the asphalt plant this spring. Now, we are using the trucks to carry black

top from plant to spreaders for highway paving.

"My drivers really like and take exceptional care of their Fords. And power steering is a great driving help and safety factor.

"We like Ford's parts standardization and availability. With some trucks we've owned, it was like sending to a foreign country to get parts. We are completely sold on Ford trucks and have two new T-800 dumps on order. They'll be used on an uranium ore haul from the mountains."

Finance the easy one-stop way! Ask about the new FORD FLEET TRUCK FINANCE PLAN!

### CAN'T BEAT FORD TRUCKS"



New '58 Ford T-800 dump takes on a 16-ton payload of "hot mix" at Broderick and Gibbons' asphalt plant, and another Ford tandem waits its turn.

Getting to the job quickly is important with the kind of loads carried in the Gilmore trucks. Shown below is one of their big Ford tandems dumping its load into an asphalt spreader.



COAL AGE . August, 1958

### Bring extra savings to your business . . . make your next truck a FORD!

Ford offers a complete line of over 360 truck models, ranging from pickups to giant tandems. And there are Ford Dealers almost everywhere, ready to help you select the truck best suited for your individual job. They're ready with modern service facilities, trained mechanics and low-priced Ford parts to keep your truck on the job, earning for you.

Ford trucks are your best buy! Ford's initial costs are low and resale value is traditionally high. The modern Ford Styleside pickups are the lowest-priced models available with full cab-wide body . . . giving you 23% more loadspace than traditional pickups.

Only Ford offers the economy of Short Stroke power in all engines, Six or V-8. And Ford's Heavy Duty V-8's offer new, advanced durability features. The modern Ford Six, available in Light and Medium Duty F- and P-Series trucks, is equipped with an economy carburetor that gives you up to 10% greater gas mileage. It's plenty peppy, too, with more horsepower per cubic inch than any other six in its class.

Ford's rugged cab and chassis construction means these new '58s are built to last. All this plus the proven fact that Ford trucks last longer adds up to America's No.1 truck value.

See your local Ford Dealer for the latest in '58 trucks or the best in A-1 used trucks.

# FORD TRUCKS COST LESS

LESS TO OWN . . . LESS TO RUN . . . LAST LONGER, TOO!



Lima Type 2000 Electric Dragline, owned by Sullivan Trail Coal Co., Pittston, Pa., at work on stripping operation. Power bines an a-c motor with a single-stage torque converter to adapt actual power output to work load demand-at constant m

### LIMA quality means extra production at this 'round-the-clock stripping operation

One of the big stripping operators in the hard coal region is the Sullivan Trail Coal Co., Pittston, Pa. Since its operation is run on a continuous 24-hr. schedule, it demands the utmost in dependability and performance from the Lima draglines and shovels that do the heavy digging.

Sullivan Trail's president, Louis J. Pagnotti, reports: "We want you to how well pleased we are with the performance of our Lima 2400 and 802 machines. We started buying your Type 2400 Draglines in 1950 and, as you know, we have purchased 11 of them. You will be interested to know that the two Type 2400 Electric Draglines delivered in February and March of 1967 are doing a fine job.

"Our six Lima 802 Shovels are used both for digging rock and loading coal. These shovels are doing a good job, also, and have proved to be a valuable investment.

"I wish to compliment you further on your promptness when an experienced factory service engineer is needed. Good service is extremely important to us, as our machines are used continuously. Waiting for a service engineer can be very costly in idle shovel time and loss of production.

"We are pleased with the many new improvments you have made in the latest Type 2400 Electric Dragline."

There's a Lima for every coal mining job—shovels ½ to 6 cu, yds., cranes to 110 tons, and draglines variable. Ask your nearby Lima distributor for full details or write to Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima. Ohio.



Lima Type 802 Shovel, one of six on the same operation.

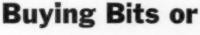
DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA Construction Equipment Division, Lima, Ohio BALDWIN · LIMA · HAMILTON



## WHICH COSTS YOU MORE...







**Changing Bits?** 

When non-productive man-hours are considered, changing bits can be more expensive than the cost of the bits alone. Idle loaders, timbermen or roof bolters, plus the time of the men changing bits all add a considerable amount to your cost per ton.

Kennametal\* bits help you cut bit changing costs two ways. First, by staying sharp longer, Kennametal Bits mine more coal between changes, at a faster rate, with less power. In addition, with minimum "spotting," the

consistently long life of Kennametal Bits enables you to schedule bit changes for normal maintenance periods.

Your Kennametal Representative can show you many other cost-cutting features throughout the complete range of Kennametal Bits for all cutting and drilling operations. Ask him about a test demonstration in your mine. See for yourself how Kennametal Bits can save you money. Kennametal Inc., Mining Tool Division, Bedford, Pennsylvania.

\*Trackemark



...Partners in Progress





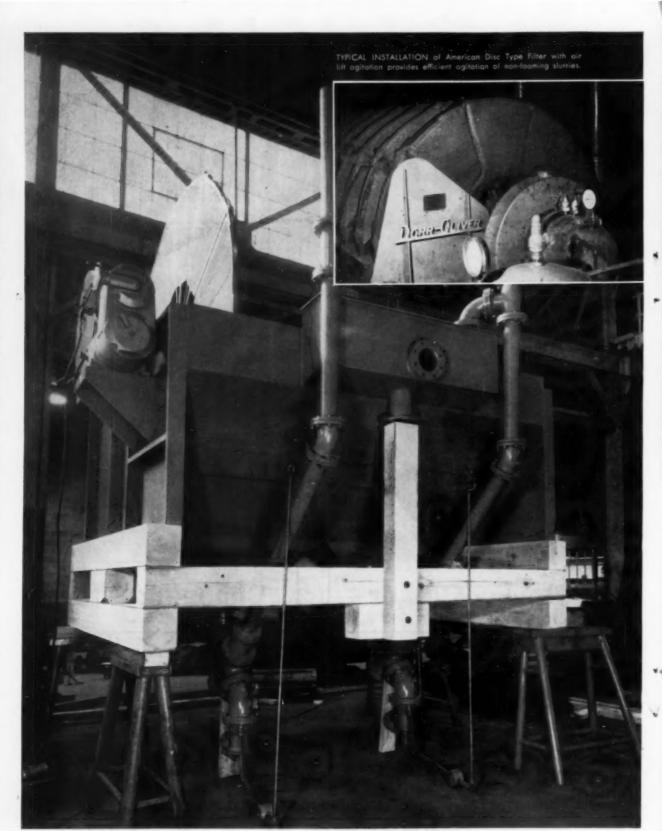






Shovels . Cranes . Draglines . Pullshovels . Roadpackers . Crushing, Screening and Washing Equipment

The last



AIR LIFT AGITATION EQUIPMENT, consisting of valves and piping, is shown in this factory floor photo of partially assembled filter. No moving parts—pressure and quantity of air controls agitation.



now . . . from DORR-OLIVER

# 3 methods of agitation on AMIERICAN FILTER

One of the most significant phases of Dorr-Oliver's continuing search for improved techniques in wet processing is the development of more efficient methods for slurry agitation on the American Disc Type Filter.

The recent introduction of torsion bearing swing type agitation is representative proof of the advanced technology resulting from this program. And now . . . with the development of air-lift agitation, Dorr-Oliver can provide three entirely different methods of agitation on the American Filter. Thus, regardless of physical characteristics of the material being handled the proper type of agitation is available from Dorr-Oliver.

1. AIR LIFT AGITATION—means no moving or mechanical parts, the degree of agitation being controlled by the quantity and pressure of air injected. The result, on most non-foaming slurries where the introduction of air is not objectionable, is a homogeneous slurry and negligible maintenance.

2. SWING TYPE AGITATION — completely eliminates lubricating and stuffing box problems. This is accomplished by torsion bearings which incorporate a special rubber compound bonded to the agitator shaft to accommodate agitator assembly oscillation. Vertical picket members extend up between filter discs to assure uniform agitation from tank bottom to slurry surface. This method is ideally suited for easily foamed or oxidizable slurries.

PADDLE TYPE AGITATION – with controlled variable speed drive, is also excellent for handling easily foamed or oxidizable material.

The availability of these three distinctly different methods of agitation is but another result of Dorr-Oliver's progressive thinking in terms of wet processing. For more complete information on the American Filter just drop a line to Dorr-Oliver Incorporated, Stamford, Connecticut.

American-I.M. Seg. U.S. Pot. OS.



# THE OLL

### Here is what you should know about its money-saving and operating advantages

How much better is the exclusive Caterpillar oil clutch than the ordinary clutch? It can be summed up in this short statement:

When the Caterpillar oil clutch is ready for adjustment, the ordinary clutch is ready for replacement. Experience in the field proves it.

In the years since 1954, when Caterpillar introduced this remarkable advance in earthmover power trains, owners all over the country have reported thousands of hours of oil clutch operation free of adjustment or repair.

Typical of these reports is this one from Myron Omernik, land improvement contractor of Custer, Wis.: "Our D7 has operated 5,100 hours without any oil clutch repairs or adjustment."

This performance record means two clear-cut money-saving advantages:

- 1. Virtual elimination of down time caused by clutch failure.
- 2. Greatly reduced repair costs.

But in addition to its economy features, the oil clutch also provides superior operation. Here is why:

- 1. A hydraulic booster on the D9 and D8, operated by clutch oil pump pressure, takes the effort out of clutch operation but retains clutch "feel."
- 2. Clutch "fade" because of overheating is practically eliminated. The oil in which the clutch parts run is pumped directly from the crankcase. This means the clutch temperature never rises above engine temperature.
- 3. A clutch brake helps match clutch and transmission speeds—making shifting easier.

Here, in brief, is how the oil clutch works:

Three metallic-faced plates are separated by oil films at all times except for the last revolution or two as the clutch is engaged. Oil enters the inner diameters of the clutch plates and circulates between them by means of grooves in the clutch facings, carrying away heat and reducing wear. All clutch parts are constantly running in oil.

The exclusive Caterpillar oil clutch is not an "extra"—it is standard equipment on the D9, D8, D7 and D6 Tractors, all Traxcavators, on the No. 12 Motor Grader and on the MD6 and MD7 Pipelayers. Yet it is an "extra" in value that is unmatched in the industry.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

### IMPORTANT OIL CLUTCH FEATURES

Independent oil pump assures positive lubrication and cooling for clutch plates, bearings and other vital moving parts.

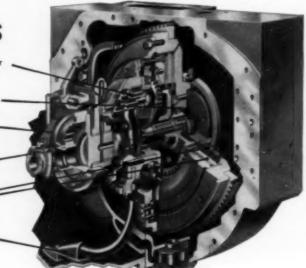
Heavy-duty bearings have extra capacity for long service life.

Clutch brake helps match clutch and transmission speeds — makes shifting easier.

Removable coupling allows clutch to be removed without disturbing engine or transmission.

Double clutch plates are metallic-faced for heavy-duty torque transmission.

Intake screens protect the oil pump from foreign material.



### CLUTCH



CAT D9 TRACTOR: "We have operated this Cat D9 Tractor for 4,000 hours in the toughest kind of work without any repairs to the oil clutch," says Frank Hill of the Silva & Hill Construction Co., Los Angeles, California. "I just wouldn't consider buying a tractor without it now."



CAT NO. 955 TRAXCAVATOR: "In over 4,000 hours on our two hard-working No. 955 Traxcavators, we have made only one simple adjustment on an oil clutch and that took only about a half hour. It's much simpler than the old friction-type clutch," says M. J. Lutz of Bethel Park, Pennsylvania.

### OWNERS REPORT TROUBLE-FREE OPERATION



CAT NO. 12 MOTOR GRADER: "Our No. 12 is starting its third season without interruption due to clutch trouble." With only one clutch adjustment in over 2,000 hours, Francis Bloomer, President of the John F. Bloomer Co., Appleton, Wisconsin, says, "We like the No. 12 with the oil clutch." This company, with 35 years of road construction work, owns a fleet of Catbuilt equipment consisting of No. 12s, D9, D8s, DW21s.

### CATERPILLAR

LEADER IN
EARTHMOVING RESEARCH

When Peabody Coal Company management launched River King mine, one of the world's largest Big Paul, 70-cubic-yard shovel at River King mine, is 12 stories high.



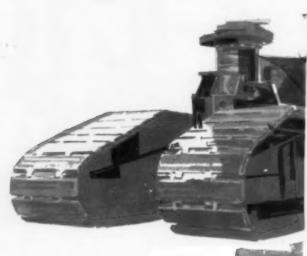


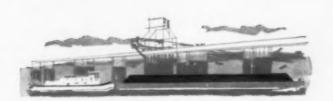
Bob Kelce, assistant mine superintendent, gets quick run-down on lubrication situation from Standard's Mervie Dillingham.

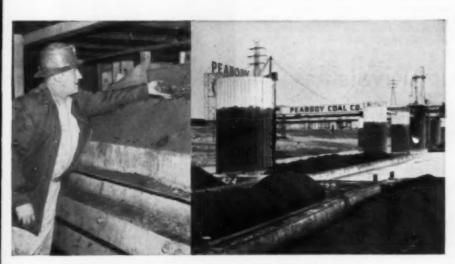
### HER

River King mine chose STANDARD OIL products

> In the pit. Hervie Dillingham and Lars Cassell, Standard Oil lubrication specialists, inspect Big Paul hydraulic jack.







In the processing plant. Herb Fox, plant superintendent, inspects coal dewaterizer. This, as well as all equipment in the processing plant was started on Standard Oil products. At the dock. Coal is moved by River King mine's railroad to Mississippl River barge loading dock. A 225-foot, 48-inch-wide conveyor moves coal from 70-ton hopper to river, loads 1,200-ton barge in about 45 minutes.



When Peabody Coal Company management launched River King mine, one of the world's largest coal mining ventures, they called for: (1) A study of lubrication and fuel requirements for the entire operation. (2) Top-quality products that could lubricate and power the equipment without failure under all conditions encountered in coal mining. This was to be done with a minimum number of products to make sure there would be no unnecessary inventories and to minimize the chances of misapplication. (3) Qualified fuel and lubrication technical service. They found what they were looking for at Standard Oil.

Standard's Hervie Dillingham, lubrication specialist with more than 20 years' experience providing technical service to coal mines, made the lubrication study. The Standard Oil products he recommended have been used extensively in coal mining operations. Hervie has recommended them before and from experience knows their ability to perform.

Hervie Dillingham lives at West Frankfort, less than 90 miles from the River King mine. He follows through on his recommendations with regular calls and inspections at the mine to make sure the Standard Oil products are meeting performance requirements.

Supplies of Standard Oil products are warehoused at Freeburg, Illinois, less than three miles from the mine. A Standard Oil man is ready to make deliveries to the mine any time of day or night.

Does this sound like the kind of service you would like to receive? You can get it by calling the Standard Oil lubrication specialist nearest you. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.



You expect more from



and get it!

### News Roundup



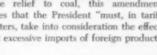
SPOKESMAN for U. S. coal industry appearing before Canada's Royal Commission on Energy in Montreal. From left to right: John A. McGrath, Fuels Research Council, Inc.; Jerome J. McGrath, Fuels Research Council; Melwood W. Van Scoyoc, public utility consultant; Robert E. Lee Hall, National Coal Association; and Dr. R. M. Hardy, J. Levesque, Henry Borden (Chairman), Dr. R. D. Howland, L. J. Ladner, G. E. Britnell of the Royal Commission.

### Coal Battles Fuel Rivals

Recent coal industry efforts to cut down competition from foreign fuels have been temporarily stymied. Coal-backed legislation to limit oil imports has been killed in this session of Congress, Efforts are now being directed toward keeping Canadian natural gas out of the U.S.

RECENT ATTEMPTS by the coal industry to gain additional protection from foreign fuel competition have ended unsuccessfully. The Senate Finance Committee has completed action on the Trade Agreements Act of 1958, after having first rejected the Long amendment, which would have restricted imports of crude and residual oils and petroleum products from abroad. Dr. Charles J. Potter, spokesman for the National Coal Association, argued for legislation which would have limited foreign oil imports to the 1954 ratio of those imports to domestic production, and which would have put these limitations on a mandatory basis.

With the rejection of the Long amendment, these efforts to protect coal were stymied for this session of Congress. Earlier this year, the Ikard amendment, which also provided for coal relief, was killed by the House Ways and Means Committee. The only remaining legislation is the Byrd amendment to the Trade Act. While not giving any concrete relief to coal, this amendment states that the President "must, in tariff matters, take into consideration the effect that excessive imports of foreign products



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DR. C. J. POTTER, National Coal Association spokesman, faces Senator Robert Kerr (D-Okla.) and Chairman Harry F. Byrd (D-Va.) of the Senate Finance

or their derivatives [such as residual oil] will have on the national security by reason of weakening the nation's economy, increased unemployment and other losses." It must still be approved by Congress and the President.

According to industry, an unfortunate aspect of the rejection of the Long amendment was that it was voted down because Senate Committeemen had expressed fear that it would endanger the passage of the whole Trade Act bill, not because of the amendment's lack of legislative value.

On another front, both management and labor of the bituminous coal industry have joined in an attempt to keep another foreign fuel-Canadian natural gas-from competing with U. S. coal.



### News Roundup (Continued)

Frank F. Kolbe, president of the U. S. National Coal Association, and John L. Lewis, president of the United Mine Workers of America, expressed coal's views in telegrams to Canada's Royal Commission on Energy, which is holding public hearings to recommend an over-all energy policy for Canada, including the controversial question of proposed natural gas exports to the U. S.

Mr. Kolbe said that the commission's recommendations "can seriously affect not only the U. S. coal industry but Canada's economic welfare and future relations between our countries." According to Mr. Lewis, the UMWA is "unalterably opposed to the importation of unemployment into the United States in the form of natural gas from Canada." He feels that American coal miners will be put out of their jobs by the importation of Canadian gas.

### Glen Alden Deal Off

The reorganization agreement between List Industries Corp. and Glen Alden Corp. has been invalidated by the Supreme Court of Pennsylvania.

The Court ruling, which both companies have agreed to, terminates efforts

to bring Glen Alden, the world's largest anthracite producer, into the fold of List Industries, a corporation with financial holdings in the textile, oil and gas, electronics and warehousing fields. Following purchase of 38.5% of the outstanding Glen Alden stock by a subsidiary of List Industries, three List men were elected directors of Glen Alden in late 1957. In March and April, 1958, the reorganization plan was proposed and put into motion, but a minority stockholder objected to the plan and charged that the rights of the minority stockholders were being violated. The courts upheld his stand, claiming that the reorganization plan was really a merger in disguise, and that the minority stockholders would have been denied the right to have their shares evaluated and bought up in the event they did not want to become part-owners of the resulting corporation.

The future of Glen Alden seems up up in the air. Francis O. Case has been succeeded as president by Harry W. Bradbury, former executive vice-president. Mr. Bradbury was president of Lehigh Valley Coal Co. before coming to Glen Alden. It seems as if Glen Alden is controlled by List interests, even though a combination of the two companies has been temporarily de-

feated. Although Glen Alden claims that it is in the coal business to stay, it has sold over \$4 million of its holdings since May. The most notable sales were those involving two anthracite silt banks at Huber Colliery which were sold to United Gas Improvement Co. for \$2 million, and approximately 778 acres of surface and coal property sold to the M. A. Hanna Co. for \$1.6 million. In addition, Glen Alden divested itself of real estate holdings, including Sans Souci Park in Hanover Township, Pa., and its offices, president's home and parking lot in Wilkes-Barre.

Glen Alden, which ran a \$2.9 million deficit by the end of 1957, has been losing money for several years. Former president Case introduced money-saving techniques in the mining operations after coming to Glen Alden in 1953. However, the company's diversification into the manufacture of air-conditioning equipment and fire engines was less successful. List Industries, on the other hand, has been running in the black. One of the objections that the court voiced was that despite List Industries' profits, it has a higher proportion of debt to assets than Glen Alden. There is some feeling that Glen Alden may be in the process of liquidation although the company has stated its intentions of staying in coal, and has announced the

### Northern Pacific Leases Power Coal

reopening of Huber mine at Ashley.

The Northern Pacific Railway Co. has signed an option agreement with a Washington municipal power company which may lead to the use of millions of tons of NP coal from its Roslyn, Wash, mines in a steam-electric plant.

Under terms of the agreement, the railway granted to the Kittitas County Public Utilities District No. 1 an option to buy NP's Roslyn mining equipment and other facilities, and an option for a lease to mine coal on a royalty basis. Exploration privileges are contained in the agreement. Terms of the agreement include a price of \$975,000-subject to adjustment-for the mine plant and a basic royalty of about 18 cents per ton of coal mined under the lease. During the two-year period of the option agreement, the Utility District will conduct engineering, financial, economic and legal studies to determine the feasibility of constructing a steam-electric generating plant to be located at Lake Cle Elum, adjacent to the coal field. The plant would initially produce 250,000 kw to help strengthen the power supply in the Pacific Northwest, which op-



### Verner Wins Old Timers' Award

WILLIAM J. VERNER, Ohio State University Senior, is shown receiving the Old Timers' Club watch award from professor J. Richard Lucas. The award, a Lord Elgin watch, is presented annually to the most outstanding senior mining engineering student at the University. Mr. Verner, from Gibsonburg, Ohio, will graduate in December, 1958, with both the bachelor's and master's degrees. He is married and the

father of two children. Mr. Verner has accepted employment by the North American Coal Corp., for whom he has worked as a student engineer during previous summers. Other in the picture are from left to right: E. H. Hebden, Jeffrey Mfg. Co.; Ralph Dean, Lorain Coal & Dock Co., and Myron Kok, Warner Collieries Co., participants in the annual conference for engineers held recently at the University.



LONG HAUL—Even the longest Barber-Greene Conveyors are built of standardized components . . . produced on a precision, quantity production basis. They can be assembled in almost limitless combinations to cut the time and cost of any material handling job.

### Long or short haul—it costs less to move materials with belt conveyors

Thousands of installations—ranging from a few feet to thousands of feet—prove that belt conveyors move bulk material at lowest cost.

No other machine is so simple in construction or requires so little maintenance. No other machine can deliver such high hourly capacities with so little power or attention.

Barber-Greene has given a new meaning to belt conveyor economy. Built of standardized components, Barber-Greene Conveyors are delivered sooner . . . require less engineering . . . are erected faster . . . give top performance . . . and are more easily altered to meet changing or expanding requirements. Being standardized, repair parts are readily available—usually from the stock of your local distributor.



SHORT HAUL—Even the shortest Barber-Greene Conveyors are available in standardized components in the width and length to suit your needs. These small conveyors provide the economical way to handle the widest range of materials with greatest flexibility.

56-7A-P



CONVEYORS...LOADERS...DITCHERS...ASPHALT PAVING EQUIPMENT

COAL AGE - August, 1958

### News Roundup (Continued)

erates almost entirely on hydroelectric power now. The Kittitas County P.U.D. might operate the proposed plant—which seems quite likely—or the P.U.D. may assign the plant to an operating agency comprised of public utility districts, municipalities and private companies. The state has made it known that it will not construct or operate the plant if a public agency can do the work, but, whoever builds and operates the plant will have to reimburse the state for the cost under the terms of the agreement.

An estimated 80 million tons of bituminous coal is available in the Roslyn coal field, one of the largest coal mining areas in the West. Results of a survey that is being conducted have been most encouraging so far and present indications point to the realization of a modern steam plant in about four years. The Northern Pacific will continue to operate its mines during the option period.

### Women Encourage Mining Students

The Woman's Auxiliary to the American Institute of Mining, Metallurgy and Petroleum Engineering is taking positive steps designed to generate interest among worthy young high school students in the careers of mining and metallurgy. The Western Pennsylvania Section has sponsored and financed a "Pilot Student Venture" as its first step in a new program of making it possible for selected students to visit mines in operation. Ten science minded sophomore high school students from the Pittsburgh area were taken in mid-July to the University of Virginia where they were housed, given suitable clothing, and guided in that region for five days.

The first operation visited was the Humphrey mine, Christopher Coal Co., near Morgantown, where most of the time was spent observing the underground equipment in action. Next day preparation plants and outside installations of Mountaineer Coal Co., in Fairmont, were examined, including the new Loveridge mine. Stripping and augermining operations at Hanna Coal Co., St. Clairsville, Ohio, were visited the following day. The last day was spent at the university summarizing and discussing the visits, and discussing the academic program of the university. Capping the trip was a dinner at which important mining people met and mixed with the lucky students. Dr. G. R. Spindler, director of the School of Mines, cooperated in making the program a SHCCOSS

Once the seeds of interest have been planted by fascinating trips such as this first one, the auxiliary will keep contact with the students as they pursue their education through high school and into college until they decide on a career. Literature and films will be used to suplement personal guidance in an attempt to inspire the students while still in high school with the fascinations and benefits of a career in mining or metallurgy.

A national committee has already been established and will be ready to promote nationwide programs offering similar opportunities to high school students in far greater numbers for the summer of 1959.

### Bureau of Mines Safety Awards

The 33rd National Safety Competition sponsored by the U.S. Bureau of Mines has ended and the winners have been announced by Secretary of the Interior Fred A. Seaton. Bronze "Sentinels of Safety" trophies and green and white safety flags, provided by Hercules Powder Co.'s magazine, Explosives Engineer, will go to all winners. On the basis of records submitted to the Bureau of Mines, the 1957 safety winners in coal mining are as follows: Republic mine, Republic Steel Corp., Elkhorn City, Pike County, Ky., in the underground bituminous category, for operating 413,-198 man-hours without a lost-time injury. A competitor in every contest for the past 12 yr, this is the first time that this mine has won the top award, although it gained honorable mention in 1956. In the underground anthracite category, the winner is Pine Knot Colliery, Reading Anthracite Co., Miners-ville, Schuykill County, Pa. Pine Knot worked 160,915 man-hours with 12 disabling injuries causing a total time loss of 312 days, for the best record in the anthracite group. This was Pine Knot colliery's second year in the competition. A feature article on how Republic achieved the safety record begins on p 100 of this issue of Coal Age.

### Pensions Reduced

The Anthracite Health and Welfare Fund has been forced to once again cut individual monthly pension payments, this time from \$50 to \$30. A 24% reduction in anthracite production in the first five months of 1958 compared with the same period in 1957 have resulted in a decrease in pension fund revenue—the fund gets 50 cents per ton of anthracite mined. With the lowered

revenue, the trustees of the fund had no choice but to cut pensions.

Several years ago the monthly pension payment was cut in half, from \$100 to \$50. The fund was created under provisions of the 1956 agreement between the United Mines Workers of America and the anthracite operators and is governed by a three-man board of trustees. Mart F. Brennan, a trustee, voiced the hope that the cuts would be temporary, but unless new markets open up for anthracite or the pension fund is able to borrow money, the pension cut may very well remain.

There are 16,100 retired miners affected by the cut. Their best hope lies in the possibility that the separate Bituminous Fund will lend some of its \$130 million balance on hand to the hard coal fund.

### AC for New Mine

A new mine near Terre Haute, Ind., being developed by Ayrshire Collieries Corp., will use 440-V AC electrical equipment made by Westinghouse Electric Corp. Initial production is estimated at from 1 to 11/2 million tons of coal annually. Delivery of the 5-kv portable underground coal mine distribution equipment and power supplies is slated to begin in September. Included will be seven 300-kva and four 225-kva nitrogen sealed power centers and fifteen underground mine-type switch houses, incorporating single and double breaker low-height units. Face equipment will be powered by AC mining motors and main line haulage will be accomplished by AC-powered belt conveyors.

### Mines, Companies

G. E. Cleaver heads a firm taking over Susquehanna Collieries' Glen Lyon mine.

Shamokin-Newport Coal Co. has leased the Glen Lyon No. 6 shaft from M. A. Hanna, the parent company. Hanna Co. will continue to prepare and sell the coal from the mine. Mr. Cleaver, who has had a great deal of anthracite mining experience, will maintain head-quarters at the colliery shaft.

Peabody Coal Co. reports increased earnings for the first half of 1958, despite decreased sales.

President Merl C. Kelce estimated sales for the first 6-mo to be down 12% to \$47 million. Net income is up about

(Continued on p 52)

### POWERSTEEL"

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#### NEW! YELLOW STRAND WIRE ROPE CLIPS...

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COAL AGE . August, 1958

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### People in Coal



STEPHEN KRICKOVIC of Eastern Gas & Fuel Associates.

### Coal Engineer

STEPHEN KRICKOVIC has recently been named director of engineering and development for the Coal Division of Eastern Gas & Fuel Associates. His appointment to this newly created position is the latest in a success story that began when Mr. Krickovic came to the U. S. from Austria-Hungary (now Yugoslavia) 44 yr ago as a ten-yr-old boy to join his father, a coal miner, who had arrived 3 yr earlier.

After high school, he went on to the University of West Virginia, graduating with a degree in mining engineering with honors in 1927. After graduation, he joined Bethlehem Mines Corp. as a trainee, and advanced to mining engineer. In 1939 he joined the Coal Div. of Eastern Gas & Fuel Associates as a ventilation engineer. He served successively as assistant chief engineer and chief engineer until his present appointment as director of engineering and development. The department he now heads consists of six sections—mine engineering, preparation, property, electric, ventilation and shaft sinking, and repairs—to oversee the operation of 15 mines in West Virginia and Pennsylvania.

Mr. Krickovic is a member of the Institute of Mining, Metallurgical and Petroleum Engineers and the Engineers' Society of Western Pennsylvania. He was chairman of both the advisory committee to the Mining Development Program of Bituminous Coal Research and the BCR Mining and Preparation Committee. In addition to all this, he is an author, having written a number of technical papers on mining problems.

John P. Hicks has succeeded Herbert R. Cleaver, who is retiring, as secretary of Lehigh-Boone Bituminous Corp. Mr. Hicks served in the Navy during World War II, following which he attended Temple University night school. He came to Lehigh Coal & Navigation Co. in 1946 as assistant to the secretary, and advanced to southern district sales manager before becoming secretary of Lehigh Navigation-Dodson Co. In his present position he will also serve as a director of the company. Mr. Cleaver has served the coal industry for 46 yr, the last 17 with Lehigh-Boone.

Arthur Hall, superintendent of Springdale mine, Allegheny Pittsburgh Coal Co., New Kensington, Pa., has retired after more than 50 yr of outstanding service in the coal industry. He was superintendent at the mine for over 23 yr, having joined Allegheny Pittsburgh after earlier service as general safety inspector of all mines of Hillman Coal & Coke Co., and superintendent and assistant general superintendent of Pittsburgh Terminal Coal Corp. After a halfcentury of service, Mr. Hall is looking forward to devoting his time to his hobbies, hunting and fishing, in southern California, where two of his children

Harold B. Wickey, of Glen Alden Corp., will head the Pennsylvania Anthracite Section of the American Institute of Mining, Metallurgical and Petroleum Engineers. Other officials elected include John S. Marshall of Coaldale Mining Co., vice-chairman, and Floyd S. Sanders of Goodman Mfg. Co., secretary-treasurer. The three-year executive committee will consist of D. E. Ingersoll, U.S. Bureau of Mines; D. M. Blackburn, Hendrick Mfg. Co.; James Tedesco, Pagnotti Interests; John C. MacCartney, consulting engineer from Kingston; and Charles Brown, Reading Anthracite Co.

The U.S. Bureau of Mines has honored three retired men. Dewey A. Reynolds, one of the men who originated the world-renowned Bureau of Mines-American Gas Association method for carbonizing coal, has received the U.S. Department of the Interior's Meritorious Service Award and silver medal. During 36 yr with the Bureau at the central experiment station in Pittsburgh, he gained world recognition as an authority on coal carbonization and related fields.

Edward H. McCleary, former district supervisor of the Bureau's health and safety activities in the anthracite region, has also received the Department's Meritorius Service Award and silver medal. Mr. McCleary received a degree in mining engineering from Pennsylvania State College in 1910. From 1914 until he joined the Bureau of Mines in 1942, he worked in various engineering, safety and managerial capacities for mining

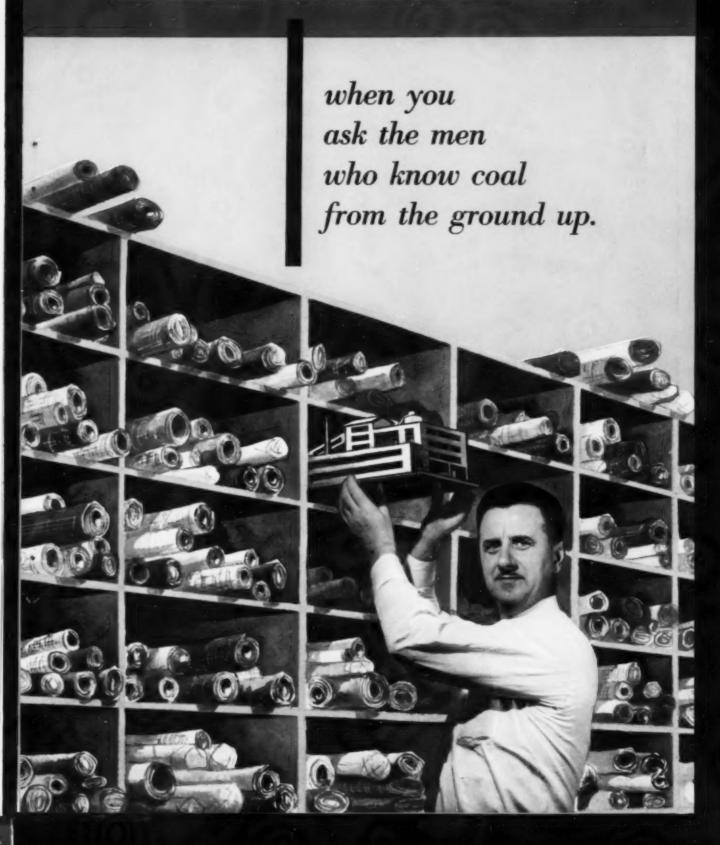
companies in Arizona, Norway's Spitsbergen Islands, Pennsylvania and Colorado. The Bureau attributes a 15% reduction in the injury-frequency rate in the Pennsylvania anthracite industry between 1943 and 1956 largely to Mr. McCleary's efforts.

Howard B. Freeman has been honored with the Department of the Interior's Commendable Service Award and bronze medal. He joined the Bureau in 1920 as an assistant electrical engineer. His noteworthy attainments include many studies which lead to the use of safe electrical equipment in underground mines, standards for Bureau tests and a system for tabulating these tests.

Dr. Felix du Breuil has been appointed project engineer for Bituminous Coal Research, Inc., and has been assigned to BCR's coal plasticity project at Columbus, Ohio. A native of Paris, France, he came to the U.S. in 1945 with a degree in mining engineering and started as a field research assistant for mine mechanization projects at Pennsylvania State University. He received a master's degree in mining engineering and then a doctorate in electrical engineering there. After spending 7 yr in teaching capacities at Penn State, he joined the Jeffrey Mfg. Co. in 1956.

Albert L. Fairley has been named executive vice-president and director of (Continued on p. 40).

### YOU CAN TAKE ADVANTAGE OF THE EXPERIENCE ON HUNDREDS OF JOBS...



### the future



River King Plant, Peabody Coal Co., Freeburg, Ill.

Alabama By-Products Corporation Alabama Power Company Alaska Railroad Company Alston Coal Company Amhert Coal Company Ayrshire Collieries Corporation

Badger Coal Company
Beaver Coal and Mining Company
Bell & Zoller Coal & Mining Company
Bevier Coal Company
Blackfoot Coal & Land Corporation
Black Star Coal Corporation
Blue Diamond Coal Company
Boone County Coal Corporation
Broken Aro Coal Company
Brophy Coal Company
Butler Consolidated Coal Company

Carbon Fuel Company Carmac Coal Company Central Coal Company Chafin Coal Company
Coal Processing Corporation
Coiltown Mining Company
Colonial Coal Mining Company
Columbian Southern Chemical Company
Crowe Coal Company

Dawson Collieries
Dawson Daylight Coal Company
Delta Coal Mining Company
Dering Coal Company
Diamond Smokeless Coal Company
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Eastern Coal Corporation
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Gaston Coal Company
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Mary Gail Coal Company
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The Maumee Collieries Company
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Midwest Utilities Coal Corporation
Milburn By-Products Company
Montana Coal & Iron Company
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Morgan Mines, Inc.

New River & Pocahontas Consolidated Coal Company Northeast Kentucky Coal Company Northern Illinois Coal Company

Thunderbird Collieries Corp., Sullivan, Ind.



## who prepare



Badger Coal Co., Philippi, W. Va.

OK Coal Company Old Ben Coal Corporation Omar Mining Company

Palmer Coking Coal Company, Inc. Paradise Collieries, Inc. Peabody Coal Company

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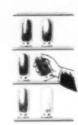
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Tasa Coal Company Tecumseh Coal Company Ten X Coal Company, Inc.
Thunderbird Collieries Company
Triple "S" Coal Company
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Valley Camp Coal Company Viking Coal Company Virginia Polytechnic Institute Vogue Coal Company

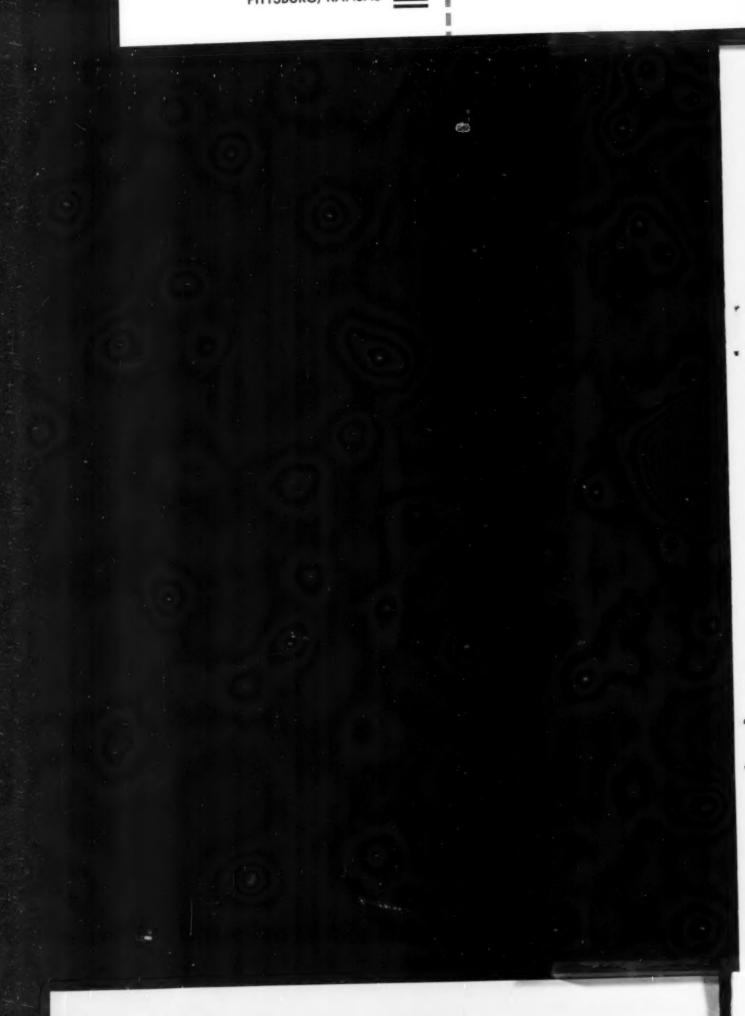
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#### People in Coal (Continued)

Dominion Steel and Coal Corp., Ltd., one of Canada's largest industrial organizations. Mr. Fairley is an executive of Shenango Furnace Co., Lucerne Coke Co. and Snyder Mining Co., all of Pittsburgh, Pa. He graduated from Birmingham Southern College in 1934 and took graduate courses in geology and mining engineering at Johns Hopkins before joining the TVA as a geologist. Since then he has served as a geologist with U.S. Steel and in several government capacities. Mr. Fairley will also hold executive positions with two DOSCO subsidiaries.

Henri P. Junod of Cleveland, Ohio, has taken over as president of the American Coal Sales Association. Vice-presidents elected by the association include C. R. Mabley Jr., president of Island Creek Coal Sales Co., J. R. Maust, president of Maust Coal and Coke Co., and J. W. Kepler, vice-president of the Consolidation Coal Co. Dr. Huston St. Clair, president of the Jewell Ridge Co., was elected secretary-treasurer.

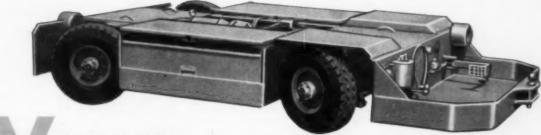
Frederick A. MacDonald has been elected secretary of Island Creek Coal Co. to replace M. L. Brennan, who is retiring. Mr. MacDonald attended Marshall College and the University of California before being graduated in law from West Virginia University in 1930. He became associated with Island Creek in 1942 as real estate manager and then as associate counsel, a position he will continue in.

Heath S. Clark has retired from Rochester & Pittsburgh Coal Co. He joined the firm in 1916 and has served the company as president and as chairman of the Finance Committee. Mr. Clark will remain on the Board of Directors.

C. E. Crafts of Rochester & Pittsburgh Coal Co. has retired. Mr. Crafts, who joined the company in 1929, was vicepresident and served also as president of the sales subsidiary, United Eastern Coal Sales Corp. He remains on the Board of Directors.

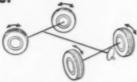
Frank A. Burns has been appointed superintendent of Crucible Steel Co.'s mine, Crucible, Pa. He succeeds A. V. Faull who was transferred to the recently-acquired Hugheston mine in W. Va. Mr. Burns grew up in a mining family, so it was only natural that he should make mining his career. He holds a Bachelor of Science degree in mining engineering from Lehigh University, where he graduated in 1948. He worked first as an engineer in training and later as assistant to the superintendent, Bethlehem Mines Corp., before coming to Crucible in 1953. He then rose from assistant mine foreman to acting mine superintendent.

#### In a KERSEY Model 744 Tractor



## VALUE is a Lot of things

For Example:



Value is its four-wheel drive and steering — making it easier than any other tractor built to maneuver in narrow, restricted travelways of a coal mine.



Value is its ample ground clearance and three-point frame suspension for good roadability over rough and muddy mine bottom.



Value is its low overall height of only 24"
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COAL AGE . August, 1958



Value is its heavy-duty battery capacity — capable of delivering six years' service with normal care.



Value is its years of time-tested, high-production and low-cost haulage performance for both trackless all-conveyor and handloading truck mines.



#### **Current Coal Patents**

By Oliver S. North

Articulated conveyor train, H. J. Harbulak (assigned to ACF Industries, Inc., New York, N. Y.), June 17, 1958. Design for a train of articulated conveyor cars which can be loaded and unloaded in transit in a coal mine. Spillage between moving cars is prevented by a lading deflecting hood spanning the space between cars. This hood is of the "floating" type, being freely carried by the adjacent ends of adjacent cars. No. 2,839,010.

In-line pneumatic-mechanical unit pulverizers, J. I. Yellott (assigned to Bituminous Coal Research, Inc., Washington, D. C.), June 17, 1958. Design for a pneumatic-mechanical coal pulverizer adapted for use in pressurized combustion systems for generation of motive fluid for gas turbines. Coal feed should be sized to minus %-inch and fluidized. No. 2,839,253.

Boring type mining machine having an adjustable boring head, P. L. Alspaugh, J. W. Heimaster and R. L. McNeill (assigned to Union Carbide Corp., a corporation of N. Y.), June 17, 1958. Design for an articulated boring type mining machine having a cutting head that can be raised and lowered to direct the course of the machine up or down and permit horizontal steering and correction for spiral. No. 2,839,281.

Mining tool for injecting liquid, such as water, at high pressure, J. Jerusel, June 24, 1958. Tool for injecting water into a borehole in coal under high pressure to reduce dusting. A rigid and dependable means is provided for securing the tool in the coal seam, so that it will not recoil and thereby endanger the operator. The tool can be extended by addition of successive lengths of pipe. No. 2.840,360.

Production of high BTU-content gas from carbonaceous solid fuels, E. Gorin (assigned to Pittsburgh Consolidation Coal Co., Pittsburgh, Pa.), June 24, 1958. In a thermoneutral process for making high BTU-content gasses from bituminous coal, the exothermic reaction between steam and coal is carried out concurrently with the exothermic carbon-

hydrogen reaction to permit excess heat from the hydrogenation reaction to supply thermal requirements of the gasification stage. No. 2,840,462.

Pulverized coal feeding and pressurizing system, A. B. Hale, M. L. Brown and S. E. Parrish (assigned to Union Carbide Corp., a corporation of N. Y.), July I, 1958. Method and apparatus for introducing coal into a fluidizer at a steady rate regardless of variations in the pressure of the oxygen coming into the mechanism. No. 2.841,101.

Method for in-situ utilization of fuels by combustion, G. J. W. Salomonsson (assigned to Svenska Skifferolje Aktiebolaget, Orebro, Sweden), July 1, 1958. System of placing boreholes in an underground bed of coal, lignite, or other solid combustible material, and subjecting the bed to substantially uniform heat despite any irregularities in the formation. The utility of the invention lies in judicious use of boreholes for introducing heat and recovering the products, and the method of advancing through a deposit. No. 2,841,375.

Method of and apparatus for forming a key-slot in a bore wall for guiding the apparatus and for inserting a flexible





MAGNAFLOAT...Foote's specially processed magnetite has what it takes for fast and efficient heavy-media separation of clean coal from refuse in raw run-of-mine:

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This popular ferrous medium is available in three grades: A Grade (max. 5% on 100 mesh, 55-70% thru 325 mesh); B Grade (90% min. thru 325 mesh); C Grade (all thru 65 mesh, approx. 50% thru 325 mesh). Write for details.



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Now there's no need to buy overweight pipe. Thanks to Victaulic engineering, you can select lightweight pipe "jobrated" to your conditions and install it the new VIC-EASY way. You'll cut costs of pipe, transportation, and handling—you'll save from 30% to 60% in man-hour installation.



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#### Patents (Continued)

conductor into the slot, J. F. Joy (assigned to Joy Mfg. Co., Pittsburgh, Pa.), July 1, 1958. Forming of a longitudinal key-slot and placing of a power line therein. No. 2,841,376.

Mining machine having three boring heads, L. D. Hagenbook (assigned to Goodman Mfg. Co., Chicago, Ill.), July 1, 1958. Improved boring machine having three equi-dimensional heads and a single elevating conveyor with its throat disposed between two of the heads. Means is provided to transfer cuttings from the third head to the conveyor throat. No. 2,841,377.

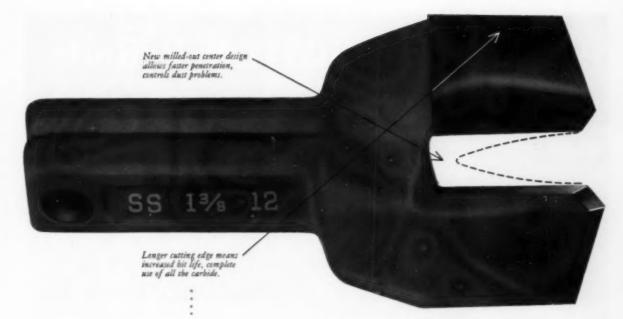
Corner sprocket mechanism for boring type mining machine, J. Karlovsky (assigned to Goodman Mfg. Co., Chicago, Ill.), July 1, 1958. Improved mechanism for laterally extending and retracting the corner sprockets for the cutter chain on the bottom bar. No. 2,841,378.

Mining apparatus and automatic feed control therefor, H. W. Driehaus (assigned to Goodman Mfg. Co., Chicago, Ill.), July 1, 1958. Automatic feed control for a mining machine, such as a machine that is responsive to load. Certain parts of the machine are driven through a preloaded clutch, wherein slipping of clutch effects stopping and reversal of the feed. No. 2.841.379.

Continuous mining machine with adjustable boring head, M. G. Thassy (assigned to Goodman Mfg. Co., Chicago, Ill.), July 1, 1958. Simple form and arrangement of means for adjusting the telescopic end portion of a boring head arm relative to its hub. No. 2,841,-380.

Fluidized carbonization, G. T. Skaperdas (assigned to The M. W. Kellorg Co., a corporation of Del.), July 1, 1958. Process for fluidized drying and heating of coal, lignite, or the like prior to carbonization and/or gasification. The ground coal is maintained in a dense, highly turbulent fluidized bed. Tar compounds vaporized during the drying operations are recovered. No. 2,841,534.

Extensible flexible frame conveyor and method of mining therewith, J. Craggs and K. McCann (assigned to Goodman Mfg. Co., Chicago, Ill.), July 8, 1958. In a wire-rope-supported conveyor structure, the tensioned strands are supported at intervals by spreader stands. The belt is maintained separately tensioned between a head and tail. The conveyor is quickly extended by releasing tension sufficiently to add a new section, moving the tail section forward, and stretching rope strands alongside the belt between fixed anchors. No. 2,842,257.



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The harder, more wear-resistant Carmet Carbide grades used on all Carmet mining tools guarantee a longer operating life for the SS Bit and greater economy of operation for you. Heavy alloy steel support under the cutting tip insures against carbide fracture and strong prongs insure against tool breakage. SS Bits are available in the following sizes: 11/6, 11/6, 11/6, 11/4, 11/4 and 11/6.

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GREATER RESISTANCE to oils, heat, abrasion, chemicals and ozone is provided by Neoprene.

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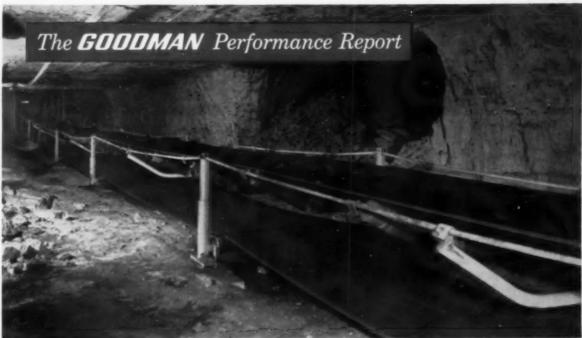
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## How to match mine haulage to production

To make high production face equipment really pay off, operators have found it takes a completely flexible, high capacity conveying system to smooth the flow of coal out of the mine. Goodman Ropebelt conveyors are designed to meet this need by matching haulage to production . . . whether from development headings, production panels, main line or slopes. In every application . . . high or low coal . . . Ropebelt pays off in ease of installation, superior load carrying ability, and low maintenance.

Consider installation . . . Ropebelt is simplicity itself. Component parts for intermediate sections (wire ropes, hinged idlers and supporting stands) are easy to handle . . . can be set up in record time as proved in many mines. Extensions to keep pace with work advance can be made between shifts with no loss in production time. Relocation of entire Ropebelt units have been accomplished at substantial labor savings.



These parts plus belting are all that is needed for a 240 ft.

extension of Ropebelt.

As to load carrying ability, Goodman Ropebelt has no equal. Its full flexibility troughs the belt to whatever load is imposed and moves it without bounce or spill. And the flexibility that absorbs shock at loading points and along the line, actually increases carrying capacity at least 20% over that of other type belt conveyors. Think what this can mean for panel belts that must accept coal from shuttle cars working behind continuous miners, and for mainline belts that carry a mine's total production.

Low maintenance is a result of the same flexibility that increases capacity. Shock to idlers is minimizedtheir life lengthened. Belts last longer and labor cost for clean-up along the line is practically eliminated.

Add up these advantages and you'll see why Goodman Ropebelts are "key" units that let you get the most from your face equipment. Let us give you the full story.

## *GOODMAN*

MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES . CONVEYORS . LOADERS SHUTTLE CARS . LOCOMOTIVES . CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts

#### Coal Abroad

#### **British Trying Hydraulic Methods**

Hydraulic coal mining, first pioneered by the Russians, is to be introduced by the British National Coal Board on an experimental basis at a drift mine at Glamorgan, Wales. High pressure 3/4-in water jets at 1,200 psi will be used to break the coal from the face and to drive the broken coal from the working area to a collection point-further fragmentation may be needed. In initial trials the coal will flow down an open channel to a screen where all coal above 2 mm in size will be separated and transferred to a normal conveyor system, the remaining slurry will be pumped to the surface, the water clarified and recirculated.

The NCB reports that advantages of hydraulic mining include (1) increased output, (2) simplicity of underground equipment, (3) surface power generation plant needs no flameproofing and (4) no explosive danger. Only four men are needed to work a jet. One steers the jet, and the others fix the pipes and supports as the jet advances.

Hydraulic transportation of 2- to 3-in lump coal is already being investigated at two other collieries in Britain. At Woodsend colliery, West Lothian, lump coal is being pumped up a vertical shaft. Horizontal transportation of lump coal through a 1,000-ft-long surface pipe is under investigation at Markham colliery, Derbyshire. Both these methods will be applied at Glamorgan if the pressure jet system proves satisfactory. Headings have already been driven and the jets will work on the pillars in such a way as to use the slope of the area to assist the collection of the debris. Trials will be extended over a 6-mo period and will cost about \$13,000.

#### BRITAIN

#### Continuous Miner

British use of American mining equipment has made another advance. The British National Coal Board has purchased and partially re-equipped an

American-made boring-type continuous miner, said to be the world's most efficient. The 32-ton machine, made by Goodman Mfg. Co., Chicago, has been successfully used in the U.S. for several ears. It has been assembled by Distington Engineering Co., Ltd., in Cumberland, England, with all-British electrical equipment. The British estimate output at 3 to 5 tpm. Although the American version has an adjustable profile, the British model has been modified to cut only a fixed one, thus faciliatating conformity to British roof support regulations. The machine has recently undergone a series of exhaustive and comprehensive tests, which it has passed with flying colors.

#### EUROPE

#### ECSC Research Projects

The High Authority of the European Community has approved three research projects closely associated with coal. The first by France and Germany, is the construction of a universal tunneling machine for coal mines, capable of cutting underground roadways through all types of geological formations, including the hardest rock, without drilling or explosive charges. The machine would load



It's a fact — under many conditions, dozer production can be boosted as much as 50% simply by installing Preco Back-Rippers! You convert deadhead time into productive time by ripping as you back. And ripping loosens packed clay, shale, rock, overburden, or other hard materials so that you do a smoother, faster, dozing job, and get a full load with less power.

There's a size of Preco Back-Ripper to suit your needs — available for all sizes and types of bulldozers . . . straight, angling or U-dozers.

So, if you'd like to make your present tractor produce like the next size larger, see your Preco-Caterpillar Dealer today! Name the date for a demonstration. For literature, write Dept. 58, Preco Incorporated, 6300 East Slauson Ave., Los Angeles 22, California. HOW TO BOOST DOZER PRODUCTION AS MUCH AS 50%



**PRECO** 

BACK-RIPPERS AUTOMATIC BLADE CONTROLS

## Right off the Wire

About half of this country has been converted to dial telephones and it is expected that within five or ten years, it will be possible to dial Europe or the Hawaiian Islands.

50

Two new developments in "fiber optics" (the use of glass or plastic fibers to transmit light around curves) are in the examination of the inside of the human body and in cryptography.

8

A new plastic reinforced with silica withstands high temperature better than steel.

52

A new technique in the use of radar antennas which involves sweeping the beam will give them a range of 3,000 miles without increasing their size.

8

Simplex researchers, D. W. Kitchin and O. S. Pratt, have developed techniques for taking photomicrograph movies of polyethylene insulation failures caused by excessively-high voltages.

8

A thermo-electric engine, based on the temperature differential between dissimilar metal plates, converts atomic energy directly into electricity with a thermal efficiency of twelve per cent.

8

A new machine uses the light from atoms of mercury to control the engraving of lines on diffraction gratings which must be less than a wave length of light apart. Accuracy is closer than one-millionth of an inch.

8

The strength of cast iron and resistance to high temperature are combined with good electrical resistance in a new ceramic.

By using a clock based on the vibration of an atom of cessium, it has been found that the length of our day has been increasing half a thousandth of a second per year.

A new television picture tube has a front of double glass with mineral oil between. This increases light transmission by reducing reflection.

A two-volt booster battery is made to supplement a regular automobile battery. It is used only in starting.

E

Simplex ANHYDREX XX insulation has greater resistance to deterioration at elevated operating temperatures than any natural rubber of GR-S heat resisting insulation.

80

A ramjet power plant for permanent earth satellites has been designed which would obtain its power from the re-combination of oxygen atoms that have been divided by comic radiation in the higher altitudes.

53

Further information on these news items and on Simplex cable is available from any Simplex office. Please be specific in your requests.

An electron tube the size of a shirt button is made of layers of titanium and ceramic. It makes the tube competitive in size with the transistor.

8

An instrument for detecting radiation is said to be so sensitive that it can detect a thousandth of a gram of chromium 51 dissolved in a river.

8

A patent has been issued for a television set that shows two programs superimposed on one screen. The images are separated by polarizing glasses and individual earphones reproduce the sound. A treatment for metal bearings is claimed to make it possible to run them indefinitely without lubrication. It has also been tested on power press tools.

63

A three-dimensional cathode-ray tube gives a display with a depth of one mile.

ER

A steel roller for a new paper mill is said to be the largest in the world. It is over twenty-six feet long and is forty-four inches in diameter.



#### Submarine cables for railroad use!

Submarine cable is required by the New Haven R.R. for the power and control of 24 movable spans at 14 railroad bridges. Old style steel armored cable suffered the ravages of salt corrosion, strong currents and constant flexing, all of which resulted in high maintenance. Replacements, as required, are made with new Simplex submarine cable, jacketed in fabric-reinforced neoprene — a product of Simplex research — a remedy for delayed service and high maintenance costs.

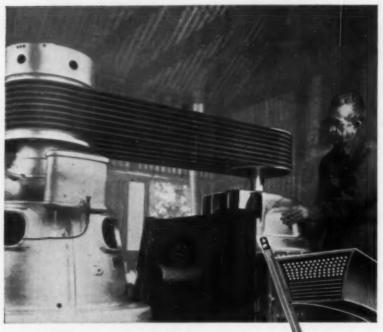
SIMPLEX WIRE & CABLE CO. Cambridge, Massachusetts and Newington, New Hampshire

Simplex

Highest quality cables for Mining Power & Lighting • Construction Transportation • Communications Signalling

"The American manufacturers of transoceanic telephone cables"

#### No. 1 choice of industry...



## the V-belt with concave sides

It is easy to see why concave sides insure far longer belt life...and make Gates the industry's first choice in V-belts.

Just make this simple test: Bend a Gates V-Belt with concave sides (Fig. 1) as if it were going around a sheave. Feel how the sides fill out...become perfectly straight (Fig. 1-A).

Note how this belt makes full contact with the sides of a sheave...grips the sheave evenly, distributing wear uniformly across the sides of the belt. Uniform wear lengthens belt life — keeps costs down.

With a straight-sided belt the sides bulge out on the bend and wear is concentrated on the bulge. Uneven wear shortens belt life — increases belt costs.

Because Gates V-Belts with concave sides are so universally preferred, they are also the **most widely available.** There are Gates distributor stocks in industrial centers throughout the world.

The Gates Rubber Company, Denver, Colorado



#### Coal Abroad (Continued)

mechanically and continuously the material it cuts down. The second project, by Belgium and France, is research on the phenomenon of instantaneous escape of firedamp in mines. The third project, by Germany, Belgium, France and Netherlands, is research on the effects of ground pressures in underground workings.

#### **OVERSEAS FLASHES**

INDIA—An Indian purchasing mission from the National Coal Development board was in Washington last mouth to buy around \$15 million worth of U.S. goods, mostly earth-moving and coal-mining machinery. The money was allocated to the state-owned coal industry under a recently negotiated \$225 million U.S. credit to India. Private coal mine owners will make their own separate purchases in the United States later on this year with money received from the U.S. credit.

FRANCE—French coal mines set a production record of 30,511,000 tons of coal in the first half of 1958. This represents an increase of 824,000 tons over the first half of 1937 even though the number of working days from January through June was unchanged at 140 for both years.

JAPAN-The first shipload of Russian coking coal resulting from a new contract has already reached Japan. The Hokkaido Trade Association has reported that the contract calls for the import of 350,000 tons of coal from Sakhalin during the 1958 fiscal year. Final shipment is scheduled for September.

CZECHOSLOVAKIA—Poland is to received a Czechoslovak credit worth \$62,500,000 for opening a new coal mine under the terms of an agreement concluded in May. The Poles will repay the loan in the form of coal deliveries. In this way Poland will be able to exploit untapped coal deposits and available manpower while Czechoslovakia will gain much-needed coal.

POLAND—Polish coal production was reported 400,000 tons over the coal plan quota for the first quarter of this year. However, the long winter and higher-than-expected industrial production led to a 350,000 ton increase in coal consumption during the same period. More efficient foreign trade apparatus and improved coal quality stemming from better washing techniques have increased Polish coal exports. The net result is steady work for the miners with no slowdowns.

# Get HIGHER OUTPUT! CUT operating costs!



PUT A

## WILFLEY

ON THE JOB!



#### Only Wilfley gives you all this:

- Maintained high efficiency throughout the life of the pump.
- Quick-change features reduce maintenance costs, minimize downtime.
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CONVEY TO COLOR U.S.A. B.O. BOX 2330 A REW YORK OFFICE: 122 EAST 42ND STOCK! NEW YORK CITY 17

#### Mayare 1951 Sent 1161

#### Mines, Companies (from p 30)

7% from \$4,155,881 figure for the first 6-mo of 1937. Coal production was 11 million tons as compared to 11.7 million tons for the same period last year. The increase in net income is said to stem from closing high cost mines, combining the firm's subsidiaries and offices, and the purchasing of shares of two subsidiaries to make them wholly-owned by Peabody. Peabody has continued production at a rate higher than the industry because 70% of its sales are made to utilities.

Eastern Gas & Fuel Associates has announced completion of a new 267-ft shaft at its Federal No. 1 mine, Grant Town, W. Va.

Increased production capacity from 10,000 to 12,500 tons per day will result from use of the new shaft, which has skip hoisting facilities. The present coal shaft and hoist will be retained for ventilation and equipment handling.

Peter Kiewit Sons Co., Omaha, Neb., has purchased Storm King Coal Co. from Mrs. William Patvaros of Sheridan, Wyo.

The purchase included 280 acres in Big Goose Creek valley as well as mining facilities. Plans for the property are indefinite and operations will probably not start this fall.

Jamison No. 9 mine of Consolidation Coal Co. has been re-named.

The mine, located in the Fairmont field and operated by Mountaineer Coal Co., division of Consol, is now called Consolidation No. 9 mine. It produced almost 2 million tons of coal last year.

#### Transportation

Norfolk & Western Railroad will scrap its fleet of 262 steam locomotives and switch to diesels.

The switch from steam to diesel, at the rate of 12 to 15 per mo, will start in October and cost \$50 million. It is interesting to note that in 1925 American railroads had 65,006 steam engines and 352 electrics. On April 1 of this year there were only 2,113 steam engines left with 27,506 diesel and 560 electric locomotives in operation.

Coal leads tonnage hauled on the Ohio River as the river boats handle a new record.

Army Corps of Engineers reports that an all-time record 81,567,152 tons of commerce was hauled on the 981-mi Ohio River in 1957. As it has for many years, coal led the traffic up and down the river with 44,600,000 tons of it hauled—3,200,000 tons more than the year before.

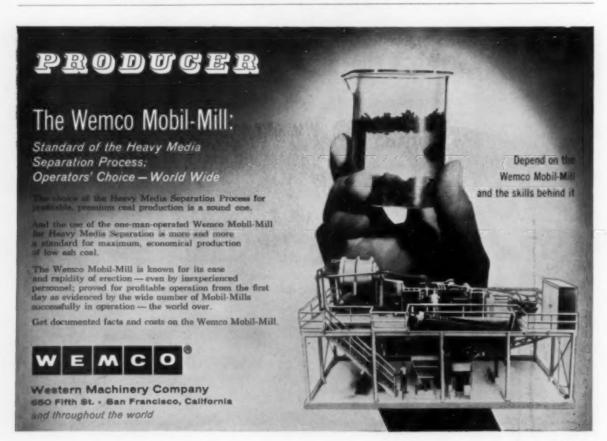
#### **New Books**

High Explosives

The Science of High Explosives, by M. A. Cook. This work is a detailed technical treatment of the physical chemistry of high explosives. It describes detonation processes and related phenomena with theoretical interpretations and copious illustrations. Special attention is given to topics with which the author dealt in 20 yr of research in high explosives. References are listed at the end of each chapter. 440 pp, including three appendixes. 7x10%-in; cloth. \$22.70, Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

Illinois Statistics

Coal Report of Illinois, 1957, contains useful information about Illinois' coal industry, including a directory of mines, (Continued on p. 56)

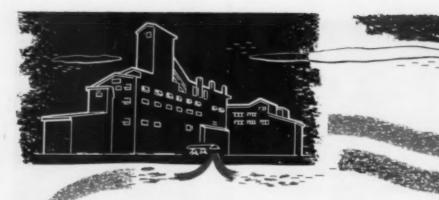




LOOK FOR THE YELLOW TRIANGLE PRODUCT OF WICKWIRE SPENCER STEEL DIVISION THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque \* Amarillo \* Billings \* Boise \* Butte \* Denver \* El Pase Fermington (N.M.) \* Fort Warth \* Houston \* Konsas City \* Lincoln (Neb.) \* Odessa (Tex.) \* Oklahoma City \* Phoenix \* Pueblo Soilt Lake City \* Tulise \* Wichibe \* PACIPIC COAST DIVISION—Los Angeles \* Caldiand \* Partiand \* Son Francisco \* Son Leandro Seattle \* Spokane \* WICKWIRE SPENCER STEEL DIVISION—Boston \* Buffalo \* Chatranooge \* Chicago \* Detroit \* Emlenton (Pa.) New Orleans \* New York \* Philadelphia

COAL AGE · August, 1958



# Your MONEY DOWN the DRAIN

Is this scene part of your coal cleaning operation? Are you literally flushing tone of salable coal down the drain? Which to produce . . . and which saved, would show a profit.

And what the ballons of water which could be used over and over!

IS AN OUTMODED CLEANING PLANT
WAXING FAT ON YOUR PROFIT DOLLARS?

Our 61 years experience qualifies us to step up the efficiency of your

## FAIRMONT

MACHINERY COMPANY

FAIRMONT / WEST VIRGINIA

existing plant. Call Fairmont, W. Va. 1672 and a Fairmont engineer will consult with you and analyze your facilities for possible cost and savings.

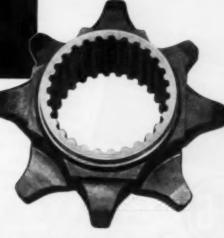


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MINING MACHINE





ment at all times.

Cincinnati Bares and Splines are especially hardoned to make them the most durable in the field.

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An Important New Development...



MAILING ADDRESS-Box 709, Covington, Kentucky

#### New Books (Continued)

mines opened or abandoned, production data, labor and safety records. Data on oil and gas wells are listed in tabular form. 127 pp. 6x9-in; cloth. Department of Mines and Minerals, Springfield, Ill.

#### Coal Chemistry

General Properties of Low-Temperature Tar, by Manuel Gomez, J. B. Goodman and V. F. Parry, summarizes the general knowledge of low-temperature tars and traces the character of coal tar from formation, through condensation to the subsequent alteration of tar products resulting from further heating. Also discussed are the relationship of carbonizing conditions and coal to the yield and the properties of the tars produced. 31 pp. 8x10%-in; paper. Bulletin 569. 20¢; Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

#### Permissible Explosives

Active List of Permissible Explosives and Blasting Devices Approved Before December 31, 1957, by N. E. Hanna and G. H. Damon, includes 160 brands of permissible explosives and 11 models of permissible blasting devices. The report explains the basis on which explosives and blasting devices are approved and summarizes the conditions under which those passing the tests are to be used. I. C. 7832. Free; Publications-Distribution Section, Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pa.

#### Preparation Facilities

Valley Camp Coal Co., Shrewsbury, W. Va.—Contract closed with Kanawha Mfg. Co. for water-clarification and finecoal recovery circuit designed to handle 8% concentration drag tank bleed using 55-ft Dorr thickener and Dorr-Oliver 8½-ft-diameter 5-disc vacuum filter. Estimated recovery 6 tph.

Pocabontas Fuel Co., Crane Creek colliery, McComas, W. Va.—Contract closed with Diester Concentrator Co. for one Concenco "77" Diagonal Deck coal-washing table with twin decks to handle 4x0.

Amherst Coal Co., Fanco, W. Va.—Contract closed with Diester Concentrator Co. for eight Concenco "77" Diagonal Deck coal-washing tables with twin decks, two Concenco Model 108 revolving feed distributors for 4-way distribution and eight Concenco Model CS splitters, 2-way. The tables to be used for 4x0.

(continued on p 60)

OTTOMATI 25, OHIO

An Important New Development...

## The LONG 下つったりから BELT CONVEYOR



Lower first cost — less maintenance • Easier installation • Selftraining • Higher capacity—less spillage!

In this unique design, the wire rope is located below the carrying belt and carrying idlers and the motion of the belt rocks the idlers in the direction of belt travel to provide automatic self-training. This feature, combined with the belt's deep 27° troughing angle, keeps the load centered at all times, materially reduces spillage, makes possible wider spacing between idlers, and provides high carrying capacity.

Adjustable height "Platform Rocker" rope support stands minimize blocking and level belt automatically.

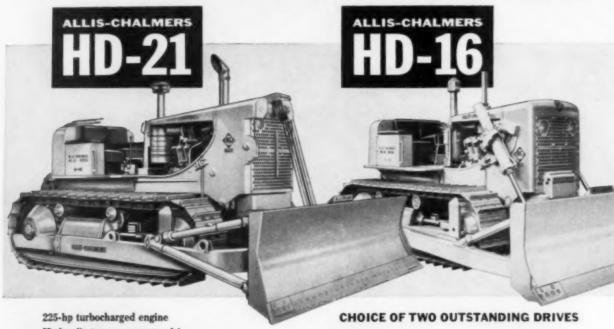
There are other reasons why it will pay you to use the LONG Lo-Rope Conveyor. This unit requires an absolute minimum of maintenance and is designed to give long, dependable service under all conditions. We'll be glad to send complete details without obligation.

For full information on LONG Lo-Rope Belt Conveyors or a demonstration, write us today



**ALLIS-CHALMERS CRAWLER TRACTORS...** 

# first choice on more and



Hydraulic torque converter drive 56,260 lb (approx. as shown)

The new HD-21 brings you live power for today's big-tractor jobs—and torque converter drive puts it to work automatically. The HD-21 offers more work capacity—dollar for dollar—than any other big crawler tractor you can buy. HD-21A illustrated—Two other models available

Hydraulic torque converter 150 net engine hp 39,090 lb (approx. as shown) All-gear drive 141 belt hp 125 drawbar hp

Get up on the HD-16 yourself—and see how it handles jobs ordinarily assigned only to bigger, more expensive crawler tractors. You'll sell yourself—just as more keen-eyed construction men do every day.

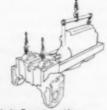
HD-16DC illustrated - Five other models available

#### THE ONLY COMPLETE LINE OF CRAWLER TRACTORS

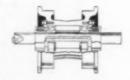
Pioneered and proved by Allis-Chalmers Engineering in Action



Torque Converter Drive gets more work done automatically provides the right pull or push for every load, at maximum speed for existing conditions. (Available in HD-21 and HD-16 only.)



Unit Construction saves valuable time...lets you remove any major assembly without disturbing adjacent assemblies.



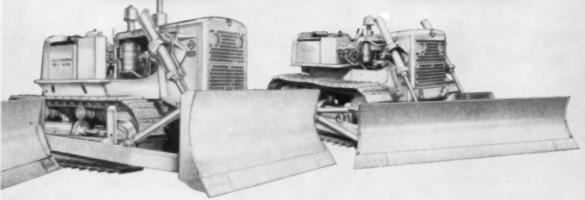
1,000-Hour Lubrication intervals for truck wheels, idlers, support rollers . . . changes daily greasing time into production time.

Look ahead...move ahead...and stay ahead

# more tough jobs



HD-6



94 belt hp

25,960 lb (approx. as shown)

The HD-11 is setting new standards in its size range ... offers you dozens of work-boosting advantages, including the industry's easiest shift pattern. A single shift takes it from any forward speed to any reversegets short-cycle jobs done faster, easier.

HD-11B illustrated - Two other models available

63 belt hp

16,470 lb (approx. as shown)

Here's up to 15,500 lb drawbar pull. The HD-6 is the only tractor near its size with big-tractor design advantages—for example, All-Steel Box-A main frame and engine-mounted dozer with direct-lift cylinders for improved weight distribution, accurate dozing and long life. HD-6E illustrated—Three other models available

#### THAT GIVES YOU ALL THESE ADVANTAGES IN EVERY SIZE



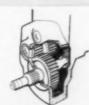
True-Dimension Track heat-treated and machined in the industry's most modern facilities, is setting new track-life records on every type of work.



All-Steel Box-A Main Frame soaks up shock and strain...provides improved weight distribution and equipment mounting.



One-Piece Steering Clutch and Final Drive Housing with extreme rigidity and strength . . . line-bored to provide precise alignment of gears and shafts.

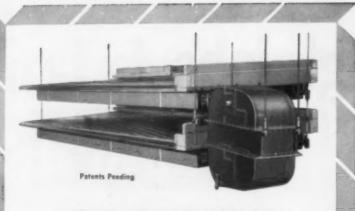


Straddle Mounting of All Final Drive Gears with tapered roller bearings on both sides of short, large-diameter shafts . . . provides extra gear life.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

with ALLIS-CHALMERS





## Double Your Coal Washing Output in Present Floor Space

Now, with the new CONCENCO® "77" DIAGONAL-DECK® Coal Washing Table, you can clean twice as much fine coal in a given floor area as was formerly possible with the best single deck tabling potential.

Not only that, but cleaning cost per ton with twin decks is substantially reduced because both decks are actuated at less than 3 H.P. from a single, integrally connected head motion . . . all in floating suspension. This, in turn, reduces impact to the building resulting in first cost savings with lighter housing structures.

For complete information, send for Bulletin 77.

For Single Deck Installations, Use the SuperDuty® No. 7 Table

Where its use may be indicated, the SuperDuty DIAGONAL-DECK Table continues to offer highly efficient and economical preparation of fine sizes. Special models are available for high refuse feeds. For full information, simply ask for Bulletin 119.





\* The ORIGINAL Deister Company . Inc. 1906

#### Preparation Facilities (Continued)

Kocher Coal Co., Good Springs, Pa.

-Contract closed with Deister Concentrator Co. for two Concenco "77" Diagonal Deck washing tables with twin decks to clean No. 2 and No. 3 buck.

Pittsburgh Coal Co., Montour No. 10 mine, Library, Pa.—Contract closed with Fairmont Machinery Co. for addition to present plant consisting of belt conveyor, loading boom and crusher to crush down to 10 in.

Pocahontas Fuel Co., Itman plant, Itman, W. Va. – Contract closed with Fairmont Machinery Co. for addition to present plant consisting of one model ES-1000 Bird Humboldt centrifuge and four Wemco Fagergren flotation cells; cell capacity, 12 to 15 tph, 48Mx0.

Pocahontas Fuel Co., Crane Creek plant, McComas, W. Va.—Contract closed with Fairmont Machinery Co. for 2-compartment clean coal conveyor, two scraper conveyors and C. M. I. dryer; additions to present plant.

Pocahontas Fuel Co., Boissevain colliery, Boissevain, Va.—Contract closed with Fairmont Machinery Co. for C. M. I. dryer.

Pocahontas Fuel Co., Deerfield colliery, Covel, W. Va.—Contract closed with Fairmount Machinery Co. for four Wernco Fagergren flotation cells; cell capacity, 12 to 15 tph, 48Mx0.

Legal Coal Co., Good Springs, Pa.— Contract closed with Wilmot Engineering Co. for installation of Wilmot heavy-media system with OCC vessel to prepare run-of-mine and bank coal. Feed capacity, 100 tph of stove to rice.

W. E. Dietrich Coal Co., Williamstown, Pa.—Contract closed with Wilmot Engineering Co. for one 12x18 Wilmot high speed crusher roll to crush egg and stove to buckwheat No. 1; feed capacity, 15 tph.

Jeddo-Highland Coal Co., Jeddo, Pa.

-One 24x30 Wilmot high-speed crusher to be supplied by Wilmot Engineering Co. for crushing stove and nut to rice or barley; feed capacity, 35 to 50 tph.

Cambria-Clearfield Mining Co., Springfield No. 6 mine, Westover, Pa. – Contract closed with Industrial Engineering & Construction Co., in conjunction with Fuel Process Co., for Belknap M-6 heavy-media coal washer, Lecco and Allis-Chalmers vibrating screens and Coyne pumps; addition to existing plant; feed rate, 150 tph 5x% to washer; 5x24, 24x14, 14x4, %x0 and combinations can be handled.



More Wheat Lamps in More Modern Mines

...month after month, every year!



Self-evident value sells WHEAT. Wheat sales forge regularly ahead because Wheat plainly provides more light per contract dollar. Wheat sales advance in the largest operations and in the smaller progressive mines - size presents no barrier to the Wheat combination of high-standard lighting and exceptionally low-cost maintenance. Charging is automatic—for one or any number of lamps. Let us detail the facts.

> **National Mine** Service Company

Koppers Building, Pittsburgh 19, Pennsylvania

All State Division Logan, W. Va.

Anthrocite Division Forty Fart, Pa.

Ashland, Ky.

Clarkson Division Backley, W. Vs. Rashville, III. Western Kentucky Division, Medisoaville, Kentucky

**Greensburg Division** Greensburg, Pa. Whiteman Division, Indiana, Pa.

Kentucky-Virginia Division Jenkins, Ky.

You, too, can roduce

Control Cable Savings
Begin with
Small Diameters

For New Work or Rewiring...



PNR - Polyethylene · Nylon · Rockhide (PVC)

#### HERE'S THE PROOF WHEN IT COMES TO CONDUIT-FILL

No.12A.W.G.		0		CONE	TIUC			ABLES	UIT	0		CONDUIT	•		ABLES
(19/		Max. Cable Dia. Table 11 H.E.C.	Number SECR PRR	one Cu	-	Max. Cable Dia. Table 11 N.E.C.	e in	one Cal		Max. Cable Dia: Table 11 N.E.C.	. (	of Conductors one Cable 3/84" 4/84"	Max. Cable Dia.' Table 11 N.E.C.		of Conductors one Cable 3/64" 4/64"
1/2"	New Work Rewiring	.450 .479	2-4 2-4			.243 .276				.234 .252			.195 .218		
3/4"	New Work Rewiring	.598 .636	5-7 5-6	2-3 2-4	2	.323 .367				.311 .335			.250		
1"	New Work Rewiring	.762 .811	9-14 9-18	4-7 5-8	2-4 3-5	.412 .468	33			.396 .427	2 23		Th the	This is an excerpt from	
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ROCKBESTOS PRODUCTS CORPORATION, NEW HAVEN 4, CONNECTICUT

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MORE THAN 16,000,000 FEET IN SERVICE

AND Small I

PNR Small Diameter Control Cable

#### You, too, can reduce

PORTAL
TIME up to
50%!

TJS Mine Portal Bus, "Low Type"

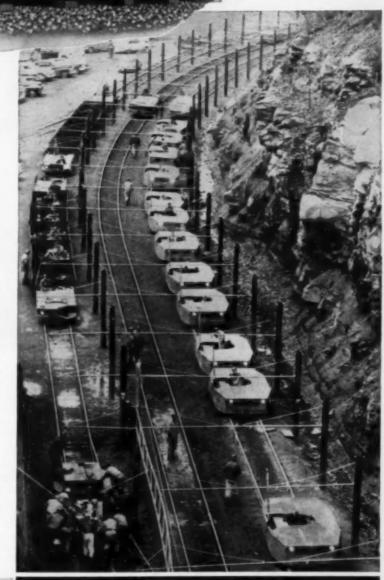
## Lee-Norse Self-Propelled

# MINE PORTAL BUS

Factual performance records prove that the Lee-Norse Mine Portal Bus can effect up to 50% savings in portal time . . . savings that result in more man hours at the section face . . . increased tonnage at a reduction in overall cost per ton.

Built in low and high types to suit your haulage road, the Mine Portal Bus features complete safety —two separate braking systems ...split-roof design that allows operator full vision at all times.

Get your personnel to and from the working face quicker . . . safer! Check the advantages of the Lee-Norse Mine Portal Bus.

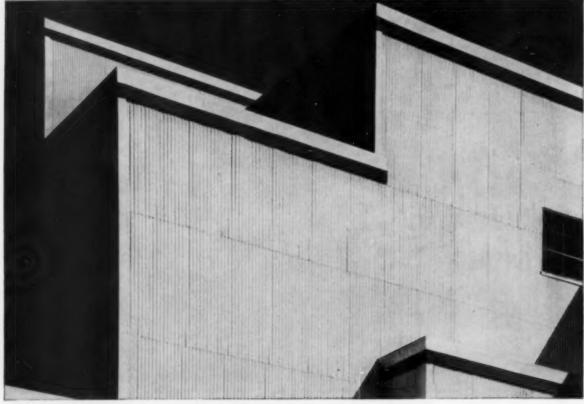


Lee-Norse Company

COAL AGE · August, 1958

63





The Peabody Cost Company. River King washing and preparation plant at Freeburg, Iffinois is entirely covered with corrugated Stainless Steel sheets. By specifying Stainless, Peabody practically eliminated maintenance costs even before the plant went into operation.

# This building will never need paint

Peabody Coal Company covered their entire coal preparation plant with corrugated Stainless Steel sheets. It was the most economical material to use!

Around a coal plant like this, corrosion takes a heavy toll of equipment and buildings. In time, the cost of maintenance—repainting and replacing corroded sections—is greater than the original cost of construction.

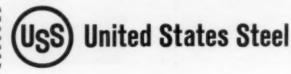
But the Stainless Steel Peabody plant will last indefinitely, with little or no maintenance, because Stainless Steel has unsurpassed corrosion resistance. It will never have to be painted and it will stay bright and clean with just an occasional washing.

They use a lot of Stainless Steel inside the plant, too, because Stainless is extremely tough and has more resistance to abrasion. It will add years of life to dryer screens, chutes, sluices, hoppers, conveyor bottoms—all equipment that calls for good wearing qualities and corrosion resistance.

Peabody engineers knew that their investment in Stainless Steel was good economics . . . because sometimes it costs less to use a steel that costs more.

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United States Steel Corporation — Pittaburgh American Steel & Wire — Cleveland Rational Tube — Pittaburgh Columbia-Geneva Steel — San Francisco Tennessee Coal & Iron — Fairfleid, Alabama United States Steel Service Centers United States Steel Export Company



# Tremendous savings at this strip mine using **D9** with Kelley Ripper



There are the figures-given to us by C. V. Jordan, mine superintendent and partner at the Ruby Chandler & Jordan coal strip mine near Madisonville, Ky. And here are his words:

"We're very satisfied with this Caterpillar D9 Tractor and Kelley Ripper combination. Since putting it in service we have reduced our cost from  $9\frac{1}{2}\phi$  per ton using explosives to  $2\phi$  per ton using the D9 and Kelley Ripper. It makes this D9 a dual-purpose machine since we can usually get all our ripping done in 2 hours, leaving it free to do dozing work in the pit."

The vein being ripped here is No. 11 coal, 6½ feet thick. In this grade, the CAT D9 Tractor rips furrows 12 feet apart, making 2 shallow passes and 2 deep cuts. In No. 12 coal, the furrows are 4 feet apart for better breaking action. At present, this mine is producing 3,000 tons per day.

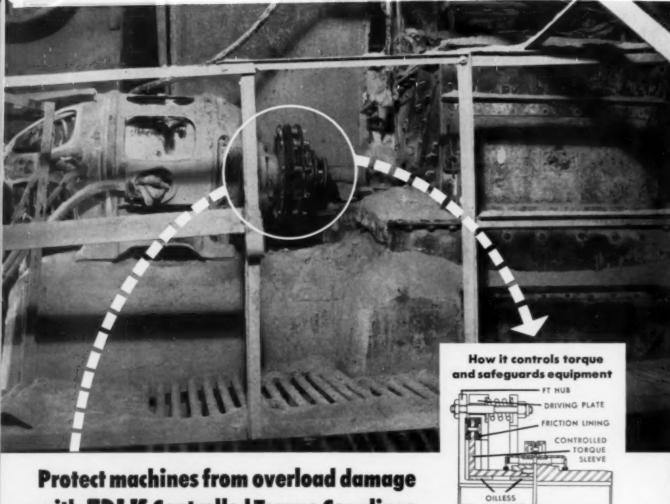
Just as the D9 with the 8-foot Kelley Ripper is the way to save money breaking 3-foot to 6-foot thick seams, the D9 with No. 9 Ripper is the best money-saving method in seams of 28-inch or less thickness.

Have you switched over from shooting coal to these new money-saving methods? If not, get in touch with your Caterpillar Dealer. Let him show you the facts and figures; have him demonstrate at your mine. He has the best buy for you—and the best after-sale service and parts.

Caterpillar Tractor Co., Peoria, Illinois, U.S. A.

CATERPILLAR





## with FALK Controlled Torque Couplings

The above picture shows a Falk Controlled Torque Coupling connecting a 150 hp motor to a hammermill. Formerly, when tramp iron got into the mill, it was necessary to rewind the motor at least twice a year. But, in the 21/2 years after installing a Falk Controlled Torque Coupling, no motor repairs were required. That is real saving!

Wherever overload danger exists, a Falk Controlled Torque Coupling gives positive protection against machinery damage from excessive torque or jams. This unique coupling has an adjustable friction slip clutch which can be set at any predetermined torque limit. Thus, transmission of dangerous shocks is prevented...overloads are limited...shaft breakage is eliminated.

Another big advantage is that, when the cause of the overload is removed, the entire coupling will rotate and transmit power without resetting, and without replacing parts or repairing the coupling....And, the Controlled Torque Coupling incorporates the famous Falk Steelflex torsional resilience to smother ordinary shock and vibration, plus the ability to accommodate shaft misalignment....Consult your Falk Representative or Authorized Falk Distributor. Ask for Bulletin 4100.

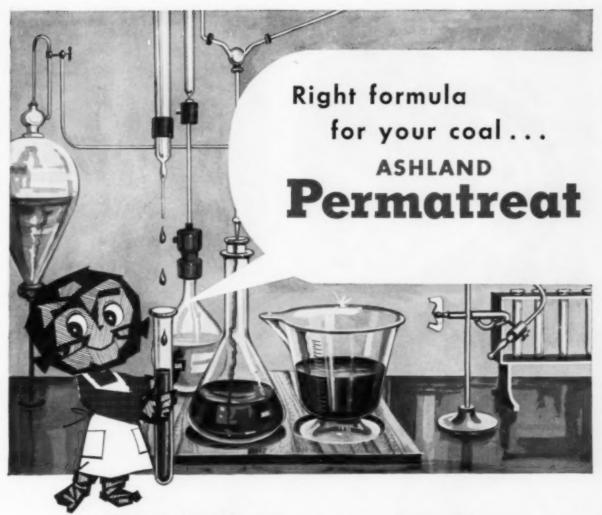
THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS Representatives and Distributors in many principal cities.

Here (as in photo), the torque-control hub is shown mounted on driving shaft. From this hub, power is transmitted through friction lining to controlled torque sleeve. Load to be transmitted is determined by the (pre-set) pressure on friction lining. In case of overload, this hub still rotates until power is shut off-but the rest of the coupling and the driven machine will slow down or stop.

#### **Motor Shut-off Control**

By adding an automatic cut-out switch with V-belt connection to driven shaft, motor can be stopped immediately. With the standard hub mounted on driven shaft, the switch opens the electric circuit when speed of switch falls below predetermined value.





Permatreat coal spray is an oil carefully refined and formulated to solve the particular problems of treating your type of coal.

When your coal is sprayed with Permatreat, it becomes dust-proof, water-proof, freeze-proof and non-corrosive.

Your coal ships and handles easier . . . stockpiles longer . . . and resists windage losses.

Convenient supply points assure immediate delivery. Yours for the asking—our special technical, research and consultant services. Just write, wire or phone us.

#### One Permatreatment lasts the life of the coal!

For immediate service call any of these convenient Ashland offices.

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Kuttawa, Ky., Phone 5501
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Frankfort, Ky., Capitol 7-4469



ASHLAND OIL & REFINING COMPANY Ashland, Kentucky



#### How New York Central's Fuel Engineer helps customers get the most out of coal

There's much more than price to be considered in the choice of a fuel. The final cost of coal, as an industrial fuel, is dependent upon modern coal-burning equipment, operation of the equipment, selection of the best type of coal for a specific burning application.

New York Central's technically trained Coal Sales Fuel Engineer is available to aid users to get the most from their coal dollar.

Call on him for these technical services: The selection of the right coal for your particular firing job . . . proximate analysis and BTU content . . . grindability for use in pulverization equipment . . . fusion analysis . . . surveys on various fuel cost comparisons . . . smoke abatement control . . . ash han-

dling problems . . . handling of frozen coal . . . stockpiling of coal.

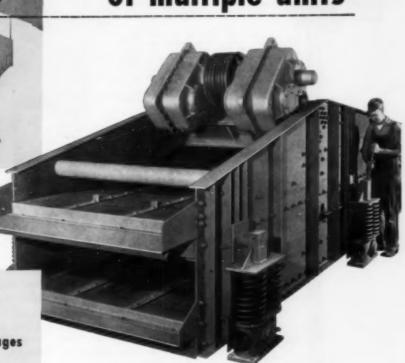
If you burn or are contemplating burning coal as an industrial fuel, the services listed above are readily available to you. Call or write: Mr. Harry A. Klester, Fuel Engineer, Coal Sales Department, New York Central Railroad, 466 Lexington Avenue, New York 17, New York.

#### **New York Central Railroad**

Route of the "EARLY BIRDS"—the one-day faster freight service

# NOW one BIG SCREEN

one BIG SCREEN does the work of multiple units



Husky 20-footer offers many profit-building advantages

**Volume** — This single, high tonnage *Low-Head* vibrating screen is a unit that out-produces a series of two or more screens in coal, metal mining and rock products fields.

#### Multiple operations on one screen —

Operations in sequence, such as draining, washing and dewatering, are accomplished on one big Allis-Chalmers screen.

#### Cut Cost...Save Space

Obviously, in the application of a single unit,

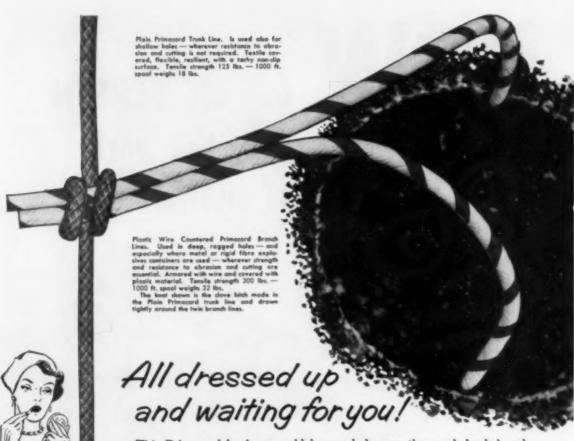
installation cost is considerably less than that of multiple units. Feeding arrangements are simpler. Collecting hoppers and chutes are easier to install. Maintenance costs are proportionately lower. And, of course, a single big unit takes up less space than a multiple unit installation.

For complete information, see your Allis-Chalmers representative or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin. Ask for Bulletin 07M7500-111.

Low-Hood is an Allis-Chalmers trademark.

**ALLIS-CHALMERS** 





This Primacord hook-up could be one hole or a thousand, loaded and primed. But it's not ready to "go" until you attach the fuse and cap or electric blasting cap onto one end of your Primacord trunk line.

This is because Primacord, the proved and approved detonating fuse, must be detonated before it can send its explosive wave into your primers or directly into your explosives charges.

The danger of premature shots is reduced to a minimum because Primacord cannot be set off by normal vibration or friction, ordinary impact or sparks, or stray electrical currents. Even a direct hit by lightning failed to detonate it.

When it goes, you'll get a blast you can be proud of!

For further information see your explosives supplier or write to

#### THE ENSIGN-BICKFORD COMPANY Simsbury, Connecticut . Since 1836

Primacord® and Detacord® Detonating Fuse, Safety Fuse, Ignitacord®, Quarrycord®, Pyrotechnical Devices and Blasting Accessories

Hook-up and detonate with

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and guard against Stray Current hazards





The square knot is used only above ground, to lengthon a trunk line of Plain or Reinforced Primacord, or to tie in Primacord A.S. Connectors. It must be drawn up tight.

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry



AUGUST, 1958

IVAN A. GIVEN, EDITOR

#### Milestone

DATE, June 14; place, Paducah, Ky. On this date and at this place the tugboat Chippewa passed with the first complete barge shipment of coal destined for Tampa, Fla. Originating at River Queen mine, on the Green River in western Kentucky, the eight barges of coal traversed a 1,100-mile route down the Ohio, Mississippi and, after transfer to ocean-going equipment at New Orleans, across the Gulf of Mexico. Destination: an electric utility changing from oil.

This trip, the forerunner of others, reflects vividly the broadening horizon for coal in generating electricity—also reflected by the fact that ten utilities not now on coal are purchasers of the Keystone Coal Buyers Manual, a Coal Age affiliate. In fact, Canada to the north might eventually get into the picture, since there is some thinking that if utilities in southern California change to coal—a not-too-remote possibility—some or all could be delivered coastwise from western Canadian mines. In any event the utility market becomes more solid day by day.

#### Critical Role

MANAGERS AND OWNERS must of necessity be cost-conscious in coal mining as well as in other industries if their operations are to stay in business and make a reasonable profit. But it would help if everybody on the payroll, including the miners, also was conscious of the critical role of cost and was actively interested in doing his part to keep it down.

The job of promoting cost consciousness throughout an organization admittedly is anything but easy. First, it is necessary to see that the word gets to all concerned. Second, and even more important, it is necessary to persuade them to actually work at keeping cost down. Third, the followup must be pointed and continuous. No one plan will fit all properties and organizations, and to get the maximum in benefits each must tailor its own. The work is considerable but the rewards are major.

#### Still Vital

MODERNIZATION is not a new word to coal mining. In fact, modernization has been an industry keystone throughout its history, and especially in the rough years since World War I when rising competition put a premium on quality and efficiency as basic approaches to the problem of staying in business, let alone making a profit. Coal's present position and its most favorable prospects for the future reflect in large measure the effort and money poured into improving plant, equipment and mining practices.

The end, of course, is not yet—for coal as well as for all industry. Recognizing this fact, McGraw-Hill publications each will devote one of their issues in October or November to the theme of modernization for profits—and as a prime method of helping get the economy back into high gear quicker. This theme is amplified and crystallized in the special editorial elsewhere in this issue. Coal Age's contribution to the program—and to ways and means of gearing up for better business and better profits for coal—will appear in the October issue.



RESTORED: Almost buried alive by a fall of slate in the mines, hospital treatment and vocational guidance have restored Asa Bolen to usefulness and life with his family at Coal City, W. Va. He is now successfully self-employed as a draftsman and map-maker. Pictured above: Gary (left), Mrs. Bolen, Wayne, Asa Bolen, Arnold, Erma Lee and Paul.

Dedicated to the Miner and his Family . . .

## The Welfare-Fund Medical Program . . .

Progress, Problems and Prospects

Nationwide system of total, cradle-to-grave medical and hospital service:

- Conserves skilled labor vital to high productivity.
- Boosts miners' morale and on-the-job attitudes.
- Provides top-quality care at reasonable cost.
- Upgrades industry stature in the national community.

By W. A. Raleigh Jr. Associate Editor, Coal Age

THROUGH A LONG, PERSIST-ENT DRIVE to provide total, firstclass medical service to miners and their families, labor and management in coal mining have achieved the following major goals:

 Found another mutually beneficial meeting ground to advance industry progress.

Brought coal new stature in the national community.

Discovery of another mutually beneficial meeting ground has come in a joint effort to conserve human resources and skilled labor vital to high productivity. The effort has materialized in the medical program of the United Mine Workers Welfare & Retirement Fund which links a 250-mi chain of 10 modern hospitals to a nationwide system of "cradle-to-grave" medical service unparalleled in private enterprise.

Labor has benefitted directly through medical aid which is now available to about a million beneficiaries, mostly bituminous coal miners, their wives and dependent children under 18. During the 11-yr period ending June 30, 1957, beneficiaries have received medical-and-

hospital-care benefits totaling over \$353 million.

In the 1956-57 fiscal year alone, expenditures of \$59,584,594 have provided 1,631,144 days of hospitalization for 93,679 beneficiaries. Medical and surgical services for these hospitalized cases required 1,566,111 visits by physicians. Additional services of specialists provided 885,944 office and outpatient clinic consultations. Cooperating in the program were 6,700 physicians and 1,263 hospitals in 45 states, the District of Columbia and Alaska.

Less measurable but equally important, management has benefitted from the medical program for its role in stabilizing employment and preventing migration of skilled workers in curtailed-production periods. Management will also gain from a major boost in miners' morale and on-the-job attitudes. This factor takes on timely significance in a business era which increasingly recognizes the close relationship between a healthy frame of mind and top-job performance. It takes on special sig-

nificance in an inherently hazardous occupation.

Under the supervision of Welfare Fund Director Josephine Roche and Executive Medical Officer Dr. Warren F. Draper, management also benefits from expert administration. A Senate committee, investigating welfare and pension plans in 1956, reported:

"The [UMWA] medical program, taken in all, can be characterized as no less than excellent." It is administered "by an outstanding group of individuals" at "very reasonable" cost. Administrative costs of the Fund, which also includes pension, disaster, and widows' and survivors' benefits, are "less than 3% of fund contributions . . . The end result could probably not be achieved by any other set of arrangements."

The sum total of benefits to management and labor has given the industry new stature in the Nation's business and social community. Star witness to the fact: In 1956, the American Public Health Association awarded the Fund the Nation's primary medical honor for outstanding group health achievement-the Albert Lasker silver statuette of the Winged Victory of Samothrace. Cited in particular was the Fund's vision, boldness and imagination in building its own modern chain of hospitals, "magnificently equipped and topstaffed extending through the hills of Kentucky, Virginia and West Vir-

Dr. Draper points with particular pride to the rehabilitation phase of the medical program. Some 317,000 beneficiaries have received corrective treatment to overcome a disability or restore the individual to full usefulness. Among the miners alone, over 97,000 have received these services. About 6,500, or 6½%, have been able to return to the mining industry; 15,500, or 16%, have found work in other industries; and 5,800, or 6%, have become self-employed.

Once called "the most brutal and savage industry," coal has proven its heart and can now lift its head high. Miss Roche, director and chief architect of the Fund's total program, makes this comment:

"No other medical plan in existence has ever undertaken to pay for its beneficiaries the entire cost of hospital and medical care in the



#### The Staff Behind the Job . . .

EXECUTIVE MEDICAL OFFICER, Dr. Warren F. Draper (above), supervises a \$60-million-a-year medical-and-hospital program and heads up a staff which now numbers about 2,700. Among these are 200 doctors, 450 registered nurses, 200 licensed practical nurses and nurse's aids, 75 lab technicians, 30 X-ray technicians, 11 medical-record librarians, 30 food superintendents and 20 dieticians.

The Fund's chief medical officer brings to this huge responsibility the rare combination of experienced medical administrator, idealist and a hardheaded business approach. He refuses to make compromises that would undermine total, top-quality medical service for miners' and their families; with equal fervor, he pursues every opportunity to provide that service at reasonable cost.

Dr. Draper feels his greatest personal contribution to the Fund's medical program has been his ability to tap top-calibre men for key staff jobs. This ability stems naturally from his genial, enthusiastic, inspiring personality. In no small measure, it also springs from long and deep experience in the medical world which includes 38 yr of distinguished service with the U. S. Public Health Service, an M.D. from Harvard University Medical School (1910), and many years of affiliation with leading medical societies.

Reporting to Josephine Roche, Welfare Fund trustee and director, Dr. Draper directs a medical and hospital staff whose key members line up as follows:

#### Headquarters, Wash., D. C.

John T. Morrison, M.D., deputy executive medical officer.
Paul H. Streit, M.D., clinical consultant.

Paul H. Streit, M.D., clinical consultant. John Newdrop, medical administrator. Gordon M. Meade, M.D., clinical direc-

Val J. Mitch, counsel to the trustees. Thomas F. Ryan Jr., comptroller. Robert Kaplan, research director. Harold W. Ward, public relations officer.

EXECUTIVE MEDICAL OFFICER, Patrick J. Painter, administrative serv-Dr. Warren F. Draper (above), superices.

#### Area Medical Officers

F. H. Arestad, M.D., Johnstown, Pa. Asa Barnes, M.D., Louisville, Ky. Dean F. Brooke, M.D., Beckley, W. Va. George M. Brother, M.D., St. Louis, Mo.

William A. Dorsey, M.D., Denver, Colo. Leslie A. Falk, M.D., Pittsburgh, Pa. Allen N. Koplin, M.D., Birmingham, Ala.

Hubert T. Marshall, M.D., Morgantown, W. Va.

William H. Riheldaffer, M.D., Charleston, W. Va.
John D. Winebrenner, M.D., Knoxville,

Hospital (top) and Medical Administrators—10 Memorial Hospitals

HARLAN, KY. Robert Lee Black David McLean Greeley, M.D., F.A.A.P. HAZARD, KY. W. Harold O'Neal Clifford A. Best, M.D. McDOWELL, KY. Harold C. Parks Frederick P. Zuspan, M.D. MIDDLESBORO, KY. Edwin L. King Warren H. Diessner, M.D. PIKEVILLE, KY. Harold W. Layer Albert H. Robinson, M.D. WHITESBURG, KY. Joseph J. Doney J. Huston Westover, M.D. WISE, VA. Herbert W. R. Emrich Charles W. Sensenbach, M.D. BECKLEY, W. VA. Steve J. Soltis Theodore S. Wilder, M.D., F.A.A.P. MAN, W. VA. N. Leon Ryburn Arthur H. Thompson, M.D. WILLIAMSON, W. VA. William B. Esson Paul A. Keeney, M.D.

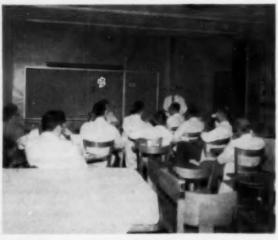


SATELLITE HOSPITAL, Man, W. Va., has been a major factor in upgrading community health. Citizenry is truly appreciative; infant mortality rate, for example, has been greatly reduced. Local union has donated TV sets and \$1,000 toward tennis court.

## Hospital Chain Provides Maximum,



SURGICAL SUITES feature modern operating and recovery rooms. Pictured: nurse Phoebe Barr, Man Hospital.



STAFFS meet regularly to discuss plans. Here, Dr. Paul A. Keeney, Williamson Hospital, holds bi-weekly meeting.

hospital regardless of how old the beneficiary may be, how often or how long he must be hospitalized, or how long the medical condition for which hospitalization is required may have existed prior to the time the patient established eligibility for Trust Fund benefits.

"No other medical plan insists upon the highest quality of hospital and medical services obtainable and sends its people to topnotch specialists and medical centers of the country if the kind of treatment they need cannot be provided otherwise."

Reaching unparalleled heights of service to the industry and the Nation has not come easy. The following pages briefly document how these heights have been achieved through vision, careful planning, perseverance, and hard-headed business acumen.

#### The Program: Why It Was Started

The seeds of the present medical and hospital care program were sown some 12 yr ago. On May 21, 1946, following the collapse of labor-management efforts to end a wartime strike, President Truman seized the bituminous coal mines and directed Secretary of the Interior Krug to negotiate a contract with UMWA. The Krug-Lewis agreement, signed eight days later, included a proviso for a Welfare and Retirement Fund to be financed by coal producers through payments of 5c per ton of coal produced for use or sale. Cor-

ollary provisions called for setting up a medical and hospital fund and for a government survey of medical and sanitary conditions in coal mining areas. Less than a year later, on March 17, 1947, a survey of the bituminous industry reported:

"Provisions for health range from excellent [mostly in non-company communities]... to very poor, their tolerance a disgrace to the Nation to which the world looks for pattern and guidance...

"The present practices of medicine in the coal fields on a contract basis cannot be supported. They are synonymous with many abuses . . .

"The evidence is convincing that three-fourths of the hospitals are inadequate with regard to one or more of the following: Surgical



CENTRAL HOSPITAL, Williamson, W. Va.-one of three-acts as hub of purchasing and other field operations for UMWA's 10-hospital chain. Satellite hospitals depend on central units for treatment of cases beyond their capability.

## Top-Quality Care at Reasonable Cost

rooms, delivery rooms, labor rooms and nurseries, clinical laboratories, and X-ray facilities . . .

"Approximately one-third of the hospitals in the Southern Appalachian area have no surgical specialists; less than half have internists, and less than half have obstetricians."

In explaining sub-standard health conditions and medical practice, the impartial government survey exculpated no segment of the industry:

"Management, labor and the families themselves are at fault for the inertia that characterizes the situation: Management because, having instituted the system of the company camp as a logical element in profit venture, neglected, with notable exceptions, to fulfill the humanitarian obligations of its dual role of employer-governor; labor, because its overpowering interest in, and concern with, conditions of wages and hours seemingly blinds it to the importance of pressing with equal tenacity for housing and sanitary reforms; finally, the rank-and-file miner, because he tolerates the eradicable evils."

With such industry inertia, the government investigators declared the clear need for action. "If it is custom and tradition that mine families shall exist in squalor, it is time for that custom and tradition to be abolished."

#### The Program: Getting It Off The Ground

UMWA boss John L. Lewis took the survey's scathing indictment as



CONVEYOR meal assembly links with vertical dumbwaiter, saves labor.

a green light to campaign for full implementation of the Medical and Hospital Fund initially provided for in the Krug-Lewis Agreement. During the following 10 yr, a major part of this campaign was to focus on obtaining increased payments to the Welfare and Retirement Fund (now 40c per ton) and on integrating the medical plan with the total fund program which also includes pension, disaster, and widows' and survivors' benefits.

No small part of the campaign was also to focus on setting up a nationwide organization to pioneer in developing a unique group medical-care program which would:

 Extend total "cradle-to-grave" medical service to miners and their families.



CENTRAL NURSING stations control and coordinate floor, patient care.

2. Provide the highest standards of care at reasonable cost.

For this formidable task, UMWA chose Dr. Draper, renowned for distinguished service as deputy surgeon general, U. S. Public Health Office (1939-47) and as General Eisenhower's major-general-in-charge, Public Health Branch, SHAEF (1944-45).

Dr. Draper took over the UMWA post Sept. 1, 1948. By Dec. 1, he had staffed 10 regional medical offices to serve coal miners and their families in 26 coal-mining states and Alaska. Service was based entirely on making arrangements with local doctors, hospitals and specialized institutions in each area.

The battle, however, to win a permanent program of top-quality,



OUTPATIENT CLINICS treat thousands of patients per month. A major activity, they handle minor ailments; screen and prevent hospital admissions.

cradle-to-grave medical service for miners and their families had only begun. Dr. Draper and his associates soon found that such an ambitious objective could only be achieved by strictly adhering to this twin principle: Spare no expense when it is vital to first-class medical treatment; cut expense wherever it involves waste, duplicate, second-rate or unnecessary services.

#### Planning for Quality Medical Service

The job of providing quality medical service took on formidable proportions early in the program. In 1949, Medical Advisory Committee reported generally dim prospects for improving medical and hospital services in the Kentucky-West Virginia-Virginia area where the concentration of coal-mining families is the highest in the country. First-class medical treatment, the committee added, could only be achieved by setting up first-class facilities and a professional environment that would attract topnotch medical talent to the area.

Facilities-UMWA picked up the recommendation of the Medical Advisory Committee and immediately pushed a \$25 million hospital construction plan in Kentucky, West Virginia and Virginia. Some 7 yr later, on June 2, 1956, the plan bore fruit in the dedication of a 250-mi chain of 10 Miners' Memorial Hospitals having a combined capacity of 1,045 beds.

The chain consists of three central, or major, hospitals and seven satellite, or community hospitals. Central hospitals are in Beckley and Williamson, W. Va., and Harlan, Ky. The seven satellites are in Man, W. Va.; Wise, Va.; and Hazard, Middlesboro, Pikeville, Whitesburg and McDowell, Ky.

In planning the hospitals, special care was taken to provide each with the latest in hospital design, methods and equipment. Featured are, for example, prefabricated, exterior window-walls; coordinated control of main lobby, emergency entrance and outpatient clinic; floor control and nursing stations; "shadowless" operating table lights and electrostatic suction tubes in operating rooms; recovery rooms; central floor-house-keeping and supply carts; and modern kitchens with production-line meal service which includes conveyor-belt assembly and vertical-dumbwaiter floor delivery.

All hospitals are connected with each other and with headquarters, Washington, D. C., by TWX teletype. Each has a pneumatic dispatch-tube system, and a central stenography room to which doctors can dictate via phone from key stations throughout the hospital.

Personnel—As vital as design, equipment and methods are, UMWA hospital planners recognized that quality medical service also requires efficient administration. Equally important is an adequate, competently-trained, back-up staff of nurses, lab technicians, medical-record librarians and administrative help.

For efficiency in hospital administration, UMWA drew heavily on the Nation's best graduate schools. Heading up Man and Williamson hospitals, for example, are N. Leon Ryburn and William B. Esson, with degrees in hospital administration, respectively, from the University of Minnesota and the University of Chicago.

For an adequate, competent backup staff, internal training programs have been stressed. Practical nurses get their training at Williamson Hospital; lab technicians at Beckley Hospital. Last September, a training program for registered nurses was set up which qualifies trainees for state board exams after 2 yr at Morehead State College, Morehead, Ky., and 1 yr at Harlan Hospital.

What effect has careful planning for well-equipped, well-staffed hospitals had on attracting topnotch medical talent? Staffing them with registered nurses and doctors has proven no great problem. RNs take readily to a nursing system which coordinates the specialized functions of professional and practical nurses and which provides modern floor-control and supply systems.

Acting as natural magnets, the hospitals have drawn a full roster of top-drawer specialists and general practicioners from many major metropolitan medical centers. The doctors find the work an answer to their fondest hopes and for this main reason: It provides a rare opportunity to combine the challenge of handling a wide variety of cases in relatively unattended communities with the advantages of a first-class professional environment.

Turnover in professional personnel because of job dissatisfaction has been negligible. Doctors and their families, too, have generally adapted well to the change from big-city life to living in coal-mining areas. The comment of one doctor's wife may be typical: "Now I've got less things to do but more time to do the fewer things I have to do."

#### Streamlining Costs

If UMWA has spared no expense vital to first-class medical and hospital service, it has also religiously espoused the cause of cutting expense wherever it has involved waste, duplicate, second-rate or unnecessary services.

Chain Economies-Planning for economy started with the construction

of a chain of hospitals. By building 10 hospitals simultaneously, Engineering News-Record, a McGraw-Hill publication, reported (March 17, 1955) an average construction cost of only \$16,000 per bed, \$23 per sq ft. "This relatively low cost was achieved by cooperative planning by the designers and the general contractor, coordinated by the single owner of all 10 projects, the Memorial Hospital Association of Kentucky, Inc.'

(General contractor for the hospital chain was J. A. Jones Construction Co., Charlotte, N.C.; Architects were: Isadore & Zachary Rosenfield, N.Y.C. -Beckley Hospital; York & Sawyer, N.Y.C.; and Sherlock, Smith & Adams

Montgomery, Ala.)

Economical use of professional personnel is achieved through the central-and-satellite-hospital system within the chain. Satellite hospitals generally are staffed only in three major specialties-medicine, surgery, and obstetrics and gynecology; central hospitals have staff members in virtually all fields of specialized medical practice. When cases come up beyond the capability of satellite hospitals, central-hospital specialists either go to the satellite hospital or the patient is transferred to the central hospital.

Further economies are realized through centralizing supply and administrative services as far as practicable. A field office in Williamson, W. Va., gains the benefits of volume buying for the entire chain. Included in this function is a standard formulary which sets common (though not rigid) specifications for the purchase of all medicines.

Based in the field office also are a central maintenance crew for handling equipment installations, building alterations, etc.; a central procurement office for technical personnel (except doctors); the administrator of nurses and the chief medical-records librarian.

Accounting, payroll and disbursement are managed from the headquarters office, Washington, D. C. Here also, the director and the comptroller of the Fund maintain strict controls for determining the eligibility of medical-benefit applicants. Worth noting: Fund medical payments become effective only after workmens' compensation benefits cease and are not authorized in cases normally handled by other medical-benefit programs such as for polio, cancer, etc.

Tentative plans call for further centralizing of chain activities, mostly at the Williamson hospital. Included in these are a central warehouse, central laundry, and possibly some central sterilizing and food-processing facilities.

Policing Service-A major effort to streamline costs has focused on careful policing of surgical practices, hospital admissions and length of stay. Implicit in this task is careful accreditation of cooperating hospitals and physicians across the country.

Within the UMWA hospital chain. bed-admissions are largely controlled through outpatient clinics. These not only handle minor ailments before they reach inpatient status but also screen out the hypochondriacs and other unjustifiable bed cases. Traffic in the clinics is heavy. One of the satellite hospitals, for example, averages, 3,000 outpatients per month and the volume is expected to increase as time passes.

Outside the hospital chain, the problem of admissions-control becomes more complex. As explained by Dr. Draper:

"We assumed at the outset that every physician was competent in the field in which he claimed to be. We believed that if we permitted our beneficiaries to choose any physician whom they wished, organized medicine at the national, state and county levels would see to it that these physicians rendered services of high quality within their capabilities and utilized specialist services at Fund expense when needed in the best interest of the patient. We believed that we could rely on physicians to hospitalize only those patients whose illnesses could not be treated adequately in the home, physician's office or outpatient clinic.

"As data accumulated, however, it was evident that in many places surgical diagnoses and operative surgery for Fund beneficiaries were inferior in quality and the amount of surgery was far in excess of that performed on others . . . Furthermore, our rates of hospital admission and length of stay were far beyond the bounds of any experience in the United States."

Upshot of the experience: The Fund decided late in 1957 to accredit only those physicians and hospitals whose services are considered neces-

sary and essential to provide authorized medical benefits. And comparing the first 7 mo after the new policy with the same 7 mo of the preceding year brought these results:

A decrease of 16% in the hospital admission rate.

A decrease of 8% in the days of hospital care.

A decrease of 8% in total expenditures for medical care.

A decrease of 6% in the cost of medical care per beneficiary.

Such results have firmed up the Fund's conviction that it must have freedom to choose physicians and hospitals if its concept of total, highquality service at reasonable cost is to be preserved.

However, the American Medical Association, endorsing all duly-licensed physicians, launched a full-scale attack to undermine the Fund's program in Kentucky where most of its hospitals are located. But a restrictive AMA-backed bill was killed in the Kentucky legislature last March. Thus, a major victory was won and the remaining questions are expected to resolve themselves in time.

#### A New Era Begins

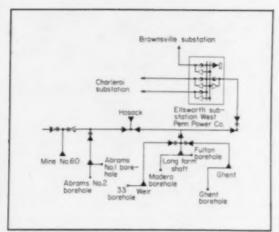
Not content to rest on present laurels, the Fund's medical program is continually reaching out to realize a new era of health and medical care in the coal fields. Already, staff members report, the 10 memorial hospitals have caused an upgrading of othe: hospital and medical services in the Kentucky-West Virginia-Virginia area.

However, "these hospitals cannot fulfill their destiny by admitting countless numbers of children with the dreaded intestinal infection so prevalent in their areas and yet do nothing to remove the reasons for this sickness. Nor can they fill their beds with sufferers from diphtheria or tuberculosis or a host of other preventable diseases without doing everything in their power to remove the causes of these needless distresses and waste of life and money.

These Memorial Hospitals are, therefore, consecrated to the care of the sick, the prevention of disease, and the preservation of the health of the people, as far as they can reach. They will serve as the nucleus and inspiration for the development of other vital services around them.'



shown above) is designed for future load growth and safety.



AC POWER DISTRIBUTION SYSTEM at Mine No. 60 (as POWER COMPANY'S DISTRIBUTION SYSTEM for the Ellsworth division supplies power to eight transformer sites.

## Bethlehem's Designs for Distributing

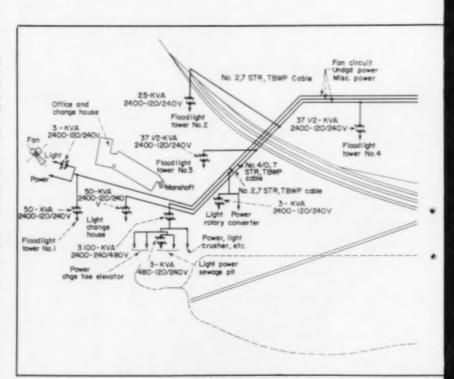
Better power for modern mining results from good design by the engineering staff of Bethlehem Mines Corp. System provides for future load growth, optimum power factor, minimum circuits, and maximum protection.

By Daniel Jackson Jr. Assistant Editor, Coal Age

THE DESIGN GOAL in developing the modern AC power distribution system serving the No. 60 mine in the Ellsworth (Pa.) Div. of the Bethlehem Steel Corp. was rated power to all loads at all times, regardless of the demands imposed upon the system. It features facilities for future demands. The designers emphasize the system's reliability and safety-plus its striking appearance which has contributed greatly to reducing maintenance and promoting good housekeeping.

The design permits separating the various circuits and dividing the loads equally among four distribution circuit breakers. These breakers are housed in a brick building at the main transformer station near the operation. The number of circuits is kept to a minimum to simplify the system, facilitate repairs and reduce maintenance.

Power-factor corrections are made at individual loads in the secondary distribution system, and for the entire 2,300-V system, by installing ca-



MAKING A PLAN AND PROFILE of the distribution system is the first step in designing a power system. It gives the designers an idea of how the various electrical



REMOTE surface substation installation shows power company's facilities.

## **AC Power**

pacitors at the switchgear house. Protective devices for the primary and secondary systems insure the safety of personnel and protect equipment. Lighting inside the preparation plant, offices, change-house,

shops and over the outside working areas was treated with as much importance as the other phases of the system design.

#### AC System and Power Contract

Power for the Ellsworth Div. is supplied by the West Penn Power Co. The power company constructs and maintains lines to all remote power sites which are metered separately. The eight remote stations, including Mine No. 60, and their loads are: (1) Mine No. 60, 2.512kw, (2) Hosack substation, 300-kw Crocker-Wheeler m-g set and 400hp fan, (3) Abrams substations Nos. 1 and 2, two 300-kw Westinghouse rectifiers, (4) Long and Fulton substations, two 100-hp compressors and one 300-kw Westinghouse rectifier, (5) Wier substation, one 300-kw Crocker-Wheeler m-g set and one 300-hp fan, (6) Ghent substation, one 300-kw Westinghouse rectifier, (7) Madera substation, one 300-kw Westinghouse rectifier, and (8) No. 54 substation, one 100-hp pump.

Power Purchase-The power company transmits power at 23 kv and reduces it to 2.3 kv for company distribution. Power is purchased on a general power service schedule, "GP." This schedule provides a 5% discount at the 2,300-V range and quantity discounts on total monthly charges as follows:—\$100, net; next \$500, 10% discount; next \$500, 20%; next \$700, 35%; all over \$1,800, 43%, plus a 2% discount when bills are paid within 10 days of receipt.

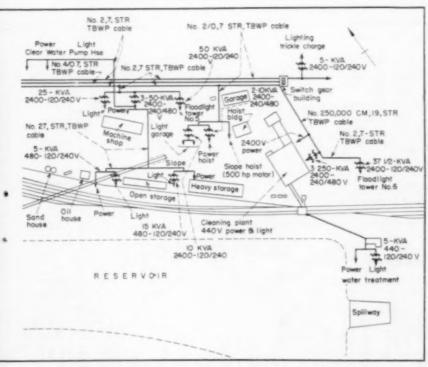
Power Factor Adjustment—The company's demand in kilovolt-amperes is determined by increasing the kilowatt demand ½% for each percent the lagging power factor is below 100%. With a leading power factor of 95 to 90%, the kilowatt demand is decreased 1½%, and if 90% or less, it is decreased 3%. The demand for a leading power factor of between 100 and 95% is taken at its kilowatt value.

Individual Metering Stations-Individual metering stations are preferred rather than having the system interconnected by the coal company's own facilities and metered at a central metering station. Under the general power service schedule, and when the sum of the individual demands of the number of power sites exceeds 15,000 kva, the quantity discounts are applied to the sum of the gross charges, calculated separately for each such connection. This schedule of service by the power company has proved most economical for the coal company from a purchased-power point of view and also because Bethlehem does not have to build and maintain power lines to the various locations.

#### Power System Design

"Because power is so important in mining today, it is essential that a distribution system be designed to supply uninterrupted power, at an economical rate to production equipment. It is the vital link which in many cases determines the success or failure of an operation," notes C. S. Cressman, chief engineer, Coal Div., in discussing the No. 60 installation.

In designing the system, considerable judgment had to be exercised after the facts were determined since all components of the system could not be expressed in numbers or solved by formulas alone. This approach enabled Bethlehem engineers to design a power-distribution system capable of supplying rated voltage



components will combine to meet the needs of the No. 60 system and eliminate costly changes in design after construction has started.







SEVEN-FRAME SWITCHGEAR ASSEMBLY con- DISTRIBUTION OF POWER in the No. 60 preparation plant is sists of an incoming power panel, metering panel and five distribution panels, plus protective devices. achieved by centrally locating and separating high and low voltage control panels. This facilitates repairs and provides for better control.

to present load demands and including provisions for additional load growth, plus safety, simplicity, reliability and maintenance.

Procedure followed in designing a system such as that at No. 60 includes:

1. Make a plan of the area indicating location of buildings, structures and points where power will be required for various operations.

2. Determine the amount and nature of the loads.

3. Select the primary and secondary voltages.

4. Locate the main transformer station, switchgear house and distribution lines.

5. Arrange circuit layout.

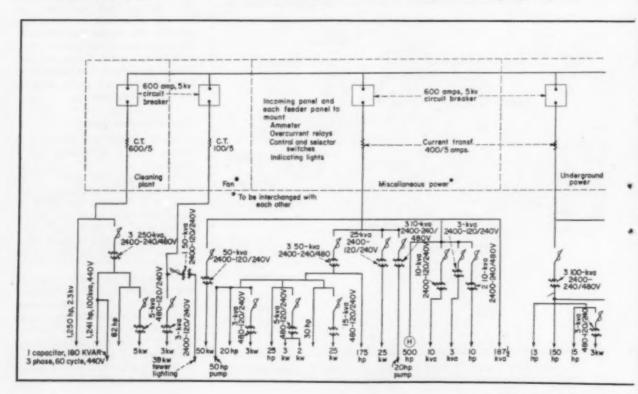
6. Provide circuit protection for

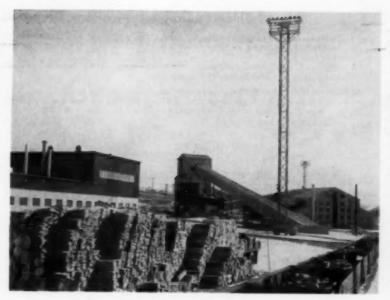
the primary and secondary distribution systems.

7. Make provision for power-factor correction.

8. Select lighting facilities for the preparation plant, offices, shops, change-house and the outside working area.

To get an overall picture of what was required in designing the power





system at mine No. 60, company engineers located all buildings and points where power would be needed. A one-line diagram was made indicating the amount and nature of each load with respect to building locations and load sites. This helped to develop the initial plan and gave an idea of how the various electrical components would

combine to meet system needs.

From the basic diagram, the power company's substation and the coal company's switchgear house were located. Distribution lines also were located from the one-line diagram. The lines were routed around the property to prevent interference with surface operations and also to contribute to the general appearance of

STEEL TOWERS equipped with floodlights produce 1- to 1½-foot-candles of light over the entire working area. This system of lighting outside areas has contributed to safety and efficiency.

the area. Location of the transformer station, switchgear house and distribution lines are shown in the accompanying diagram.

Overhead pole lines were designed to limit the distance between pole spans to an average of 160 ft, with a maximum of 200. Each wire or cable was limited to a tension of 1,800 lb.

Primary and Secondary Voltage Selection-The primary voltage was fixed at the 2,300-V range. This selection was based on the fact that the same voltage was being used at other mines in the Ellsworth Div. Thus, since standardization of the overall system was a desirable feature and would permit equipment to be interchanged, the selection was not a difficult problem. Other significant factors considered in selecting the primary voltage include: (1) total load of the system, (2) transmission distance, (3) type of loads and (4) safety.

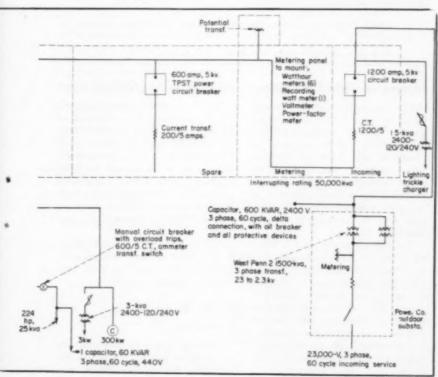
Motors of 100 hp and below were designed for 440-V operation and those above were generally designed to operate at 2,300 V. The utilization voltage was selected as 440.

Switchgear Selection and Circuit Arrangement-With the location of the switchgear house and main transformer station and the selection of the primary and secondary voltages completed, the job of selecting the type and rating of the switchgear was the next step.

From the company's calculations and by consultation with the power company, an oil circuit breaker having an interrupting capacity of 50,000 kva was selected for control of the incoming power.

Switchgear equipment selected was a seven-frame ITE Multimite assembly, Type 5-HV-50, with a 2,400-V, 3-phase, 60 cycle rating. The main circuit breaker has a 1,200-amp, 5-kv rating with each of the distribution

SWITCHGEAR ARRANGEMENT and one-line diagram of the electrical system (left) is the final arrangement of equipment and load distribution of the No. 60 system. The switchgear consists of a seven-frame assembly with a 2,400 V, 3-phase, 60-cycle rating.



breakers rated at 600 amp, 5 kv. Breakers are the enclosed drawout type with no exposed live circuits and are operated by a 60-cell, 125-V battery unit.

The incoming panel and each distribution panel is equipped with a circuit breaker, current transformer, ammeter, over-current relays, control and selector switches and indicating lights. The metering panel has six watthour meters, one recording wattmeter, voltmeter and power-factor meter. The five individual distribution breakers divide the system load so that each breaker carries its share. This method also confined system failures and aids in making repairs quickly. The distribution panels are divided into four circuits: (1) underground, (2) preparation plant, (3) fan, and (4) miscellaneous power. A fifth panel was included for future load growth.

The fan and miscellaneous panels are arranged so that the loads can be interchanged. This helps to keep loads divided.

Additional equipment in the switchgear building includes a General Electric 600-kvar capacitor bank complete with oil breaker and necessary protective devices.

#### Underground Voltage Distribution

Special attention was given to the underground AC circuit from the switchgear house to the slope bottom. Because of the nature and size of the load-two 100-hp, 440-V motors that power a double-roll crusher-specific requirements were necessary. Calculations showed that the 500,000-cm cable carrying 440 V to the slope bottom would produce an excessive voltage drop especially if primary voltage was not maintained. Since the torque on an AC motor decreases as the square of the reduced voltage, this drop might cause the crusher motors to stall.

To correct this condition, the effect of installing a capacitor was checked. Calculations showed that a 60-kvar capacitor would keep the voltage drop within a satisfactory range. The capacitors consequently were installed and the motors have operated without interruption.

How the voltage drop in this circuit, i.e., from the switchgear house to the slope bottom, and the capacitor value were determined is shown in detail in an accompanying table.

#### How Bethlehem Calculates Voltage Drop and

- Voltage drop between switchgear house and three 100-kva transformers located at borehole. Maximum load is 600 kw; Wire size, 4/0 copper; Length of circuit, 1,910 ft.
- Resistance = 0.2776 ohms per mile (25 C); Reactance = 0.5751 ohms per mile (2-ft spacing); Power factor, 95% lagging.
- ES =  $\sqrt{(ER \cos \theta + IR)^2 + (ER \sin \theta + IX)^2}$
- ES = Sending end voltage to neutral; ER = Receiving end voltage to neutral; Cos θ = Power factor = 0.95; Sin θ = Reactive factor = 0.3123.
- (1) I =  $\frac{\text{KW} \times 1,000}{\text{V} \times \sqrt{3} \times \text{PF}}$

I = Amperes = 
$$\frac{600 \times 1,000}{2,300 \times \sqrt{3} \times 0.95}$$
 = 158 amp

- 2) R = Resistance (ohms per mile) X Length of circuit in ft 5,280 ft/mi
- R = Resistance =  $0.2776 \times \frac{1.910}{5.280} = 0.1004$  ohms
- (3) X = Reactance =  $0.5751 \times \frac{1,910}{5,280} = 0.2080$  ohms
- (4) ER = Received voltage to neutral =  $\frac{\text{System voltage}}{\sqrt{3}} = \frac{2,300}{\sqrt{3}} = 1,329.5 \text{ volts}$
- (5) ES =  $\frac{\sqrt{(1,329.5 \times 0.95 + 158 \times 0.1004)^2 + \frac{1}{(1,329.50 \times 0.3123 + 158 \times 0.2080)^2}}}{(1,329.50 \times 0.3123 + 158 \times 0.2080)^2}$ ES =  $\sqrt{(1,836.276.5 = 1,355 \text{ volts})}$
- (6) Voltage drop =  $\frac{1.355 1.329.5}{1.329.5} \times 100 = 1.92\%$ 
  - 2. Voltage drop of cable in borehole. Maximum load = 235 kw; Wire size = 500,000 CM, 3-conductor cable, 600 V. Type RH insulation, 75 C copper temperature; Length of circuit = 400 ft; Power factor = 95% lagging. The following values are calculated the same way as those in the preceding: I = Amperes = 325 amp; R = Resistance = 0.01168 ohms; X = Reactance = 0.01084 ohms; ER = Received voltage to neutral = 277 V.
- (1) ES =  $\sqrt{(277 \times 0.95 + 325 \times 0.01168)^2 + (277 \times 0.3123 + 325 \times 0.01084)^2}$ ES = 281.7 V
- (2) Voltage drop =  $\frac{ES ER}{ER} \times 100 = \frac{281.7 277}{277} \times 100 = 1.7\%$ 
  - 3. Voltage drop from bottom of borehole to slope. Since this circuit is the same as the circuit from the top to the bottom of the borehole the voltage drop for this leg of the circuit will be the same.
    The total percentage voltage drop of the circuit equals:

#### Preparation Plant Distribution

The cleaning plant circuit was treated in the same manner as the underground circuit. Two voltages are used to power the various motors in the plant—440 and 2,300. A 180-kvar, 440-V capacitor was added to the circuit to counteract the 440-V inductive load. Power-factor correction for the 2,300-V inductive load was taken care of by the capacitors in the main switchgear house.

The switchgear for the 2,300- and 440-V controls in the preparation plant is of the Cabinetrol totally-enclosed type. The control room is ventilated by forcing air through filters. Although the centrally located control method requires more cable and contuit than when controls are located at the individual loads, the extra cost is considered small as compared to maintenance and control advantages.

#### AC Service to DC Substations

Power-conversion units supplying DC for mine use are located both on the surface and inside the mine. They are normally 2,300-V 300-kw rectifiers. When substations are inside the mine, power is fed through boreholes by a 3-conductor, 2,300-V cable. Each AC borehole is equipped with a polemounted oil switch with an automatic overload trip for disconnecting purposes.

Surface substations feed DC power to the mine through boreholes by 1,000,000-CM cables for each positive and negative feeder.

#### System Power Factor Correction

Although power factor corrections are made at individual loads of the secondary transmission system, cor-

#### Capacitor Requirements of an AC Circuit

Switchgear house to transformers In bore hole		(2,300 V) (440 V)	300	1	70%
Bottom of borehole to slope		(440 V)	=	1	70%
		777			2200

4. Capacitor requirements, in 440-V underground circuit:

Load								KW
Motors			-		-		-	210
Lights		*	-	-		-		25
				7	Tota	1		235

Assume a power factor of 80% lagging: (Cos  $\theta = .80$  and Tan  $\theta = .75$ )

(1) KVA = 
$$\frac{\text{KW}}{\text{P. F.}} = \frac{210}{0.80} = 263 \text{ (motor kva)}$$

(2) KVAR = KW × Tan 
$$\theta_1$$
 = 210 × 0.75 = 157

Lighting is equal to 25 kw at unity power factor. Total KW = 235; KVAR = 157.

(3) Tan 
$$\theta_1 = \frac{157}{235} = 0.67$$
,

Therefore, Cos #; = 0.831.

(4) KVA = 
$$\frac{\text{KW}}{\text{Cos }\theta_1}$$
 =  $\frac{235}{0.831}$  = 283

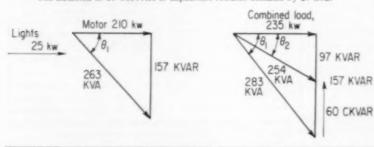
Add 60 CKVAR of capacitors: (157 KVAR - 60 CKVAR = 97 KVAR).

(5) 
$$Tan \theta_2 = \frac{KVAR}{KW} = 0.413,$$

Therefore Cos 02 = 0.924, or 92.4% power factor

(6) KVA = 
$$\frac{\text{KW}}{\text{Cos } \theta_2}$$
 =  $\frac{235}{0.924}$  = 254

The addition of 60 CKVAR of capacitors reduces demand by 29 kva.



rection for the overall 2,300-V system was necessary to maintain a 95% lagging power factor, which is the approximate limit of economical correction. This correction would eliminate penalties by the power company for poor power factor and at the same time reduce power bills and increase the capacity of the power distribution system.

Calculations showed that the system required a 600-kvar capacitor bank to keep the power factor at 95% lagging. The procedure is shown in an accompanying table.

#### System Protection

The main circuit breaker protects the complete system while the individual distribution breakers protect separate circuits. Further circuit and equipment protection is provided by installing rated fuses at each load.

Lightning protection was provided for overhead lines and for machine installations. Station type arresters were used for the larger motor installations, with line-type arresters on the smaller motors and on the transmission lines at spacings of approximately 1,500 ft.

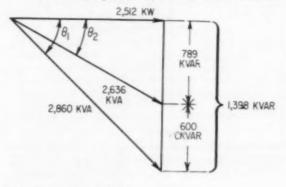
#### Lighting Facilities

Design of the power distribution system at mine No. 60 did not end with providing power for motors and DC conversion units. The company

#### How Bethlehem Calculates Capacitor Requirements for Power-Factor Improvement

							KW	KVA	KVAR
un	ď.					2	235	254	971
pla	int						1,250	1'480	758
		0	0				372	465	278
							201	*******	2
sho	op.		0	2	.0		130	163	97
						0	224	280	168
	0						100	3	3
al			0				2,512		1,398
	pla	und . plant shop	und	und	und	und	und.	und. 235 plant 1,250 . 372 . 201 shop 130 . 224 . 100	und. 235 254 plant 1,250 1'480 . 372 465 . 201

(1) Includes capacitor. (2) Not included in calculations,



$$- (1) \operatorname{Tan} \theta_1 = \frac{KVAR}{KW}$$

Tan 
$$\theta_1 = \frac{1.398}{2.512} = 0.557,$$

Therefore  $Cos \theta_1 = 0.874$ .

(2) 
$$\cos \theta_1 = PF = \frac{KW}{KVA}$$

KVA = 
$$\frac{2.512}{0.874}$$
 = 2,860 (before correction).

Since the power factor is to be improved to 95.3%,  $\cos \theta_k = 0.953$ , therefore  $\tan \theta_k = 0.318$ .

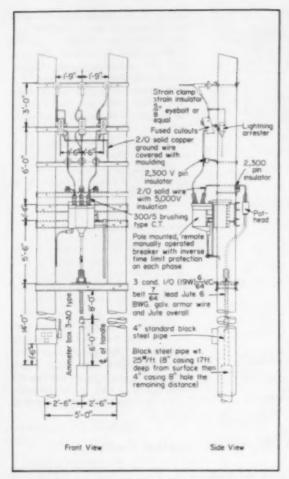
$$CKVAR = 2,512 (0.557 - 0.318)$$

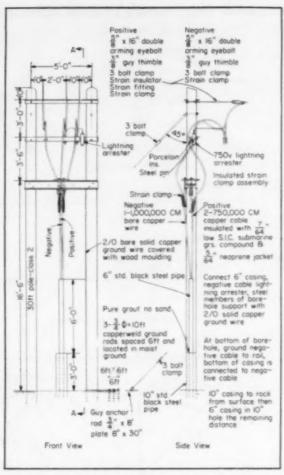
CKVAR = 
$$2.512 \times 0.239 = 600.4$$
 (capacitor added to system)

(4) KVA = 
$$\frac{KW}{\cos \theta_*}$$

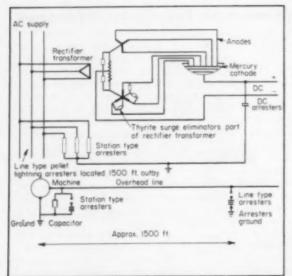
$$KVA = \frac{2.512}{0.953} = 2.636 \text{ (after correction)}$$

The addition of capacitors reduces the demand by 224 kva.

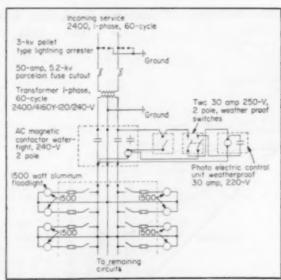




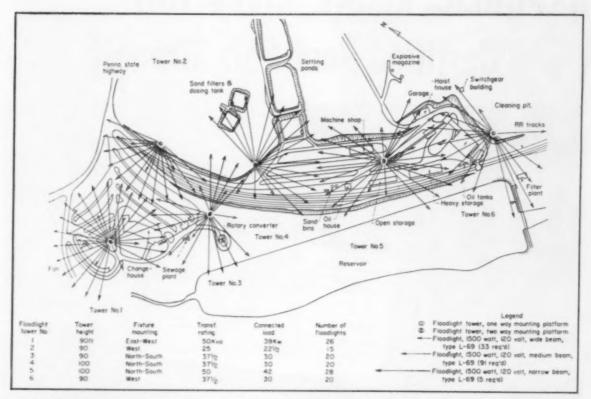
STANDARD AC AND DC BOREHOLE INSTALLATIONS provide adequate protection for men and equipment. Details of each installation are shown in this illustration. Protective devices are shown in each of the installations.



TYPICAL LIGHTNING PROTECTION for equipment and distribution lines has proved 100% effective against lightning.



CONTROLS AND PROTECTIVE DEVICES for a light tower include photoelectric units, fused cutouts and arresters.



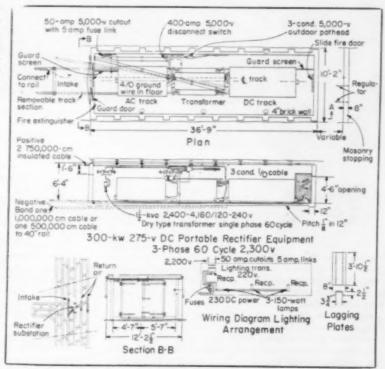
HOW TOWERS were located and lights were directed to enable the six light-towers to furnish light for the wide area that had to be illuminated indicates the amount of planning necessary to produce a good lighting system.

felt that good lighting would help promote safety, encourage good housekeeping and contribute to efficiency.

Outside lighting facilities for the yard, tracks and working areas consists of six steel towers 90 to 100 ft high equipped with floodlights. By properly locating towers and adjusting floodlights, excellent uniform lighting of 1 to 11/2 ft candles was produced over the entire area. The six towers added to the general appearance of the area by eliminating the many wood poles and wiring that would otherwise be required over the wide area covered. Company officials have voiced their approval of the lighting installation as being "most satisfactory and proving its value in terms of safety and efficiency."

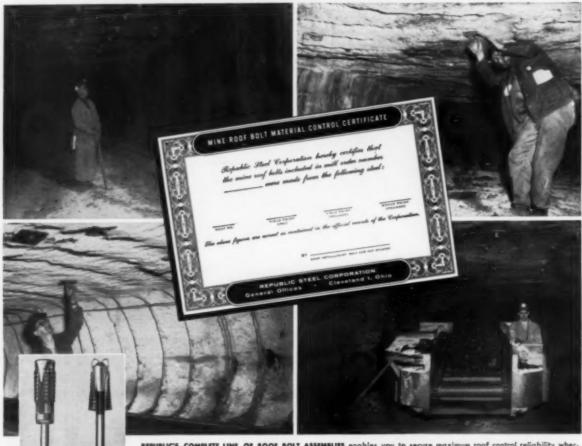
The cleaning plant system was designed to provide 1 watt per square foot with additional intensity at local points requiring more light. Incandescent lighting fixtures were preferred in this particular application.

Offices and change-house were lighted with fluorescent lamps, generally recessed and providing an intensity of 15 to 25 foot-candles, depending on the usage.



UNDERGROUND SUBSTATION INSTALLATION, detailed in this drawing, typifies Bethlehem's efforts to provide safety for men and equipment.

# Certified Roof Bolt Strength



REPUBLIC'S COMPLETE LINE OF ROOF SOLT ASSEMBLIES enables you to secure maximum roof control reliability wherever roof bolting is practical. Newest shell types are shown in inset. Unit on the left, mounted with a pal nut on a square head bolt, is the RE-2 expansion shell for use in relatively soft rock. It can be shipped assembled with the bolt, or separately. Unit on the right, the RE-3, is well suited to harder formations.

Next time you order roof bolts, consider these facts: First, Republic Roof Bolts cost no more than any other brand. Second, Republic, alone, certifies the strength of the steel used in roof bolt

manufacture. The Material Control Certificate, which is included with every shipment, guarantees that physical properties meet or exceed the mining standards approved by the American Mining Congress and American Standards Association.

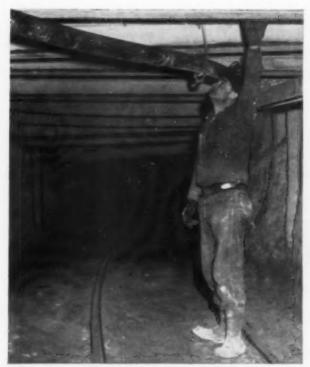
Republic is able to offer this exclusive Certification Program through complete control of all manufacturing operations, from mining and blending of ores to final inspection of finished roof bolt products. During processing, samples of each heat of steel are tested to destruction to make sure that bolts will meet established performance specifications. Heats are kept separate so that individual

test results can be entered on certificates as shipments are made.

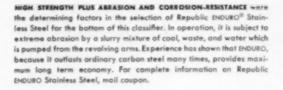
Beyond laboratory verification, however, Republic maintains a continuous field testing program to double check performance under actual service conditions. Every new design is subjected to exhaustive trials in Republic's own mines. Performance capabilities are documented and, equally important, complete data are gathered showing strata conditions, methods of placement, and spacing to which each design is particularly adapted.

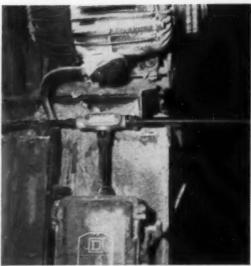
As a result, Republic offers the widest selection of completely proved roof bolt assemblies available from a single manufacturer. Moreover, Republic can provide engineering assistance to help you select the type or types best suited to your conditions.

It will pay you to get all of the facts on certified-strength Republic Roof Bolt Assemblies. Simply contact your nearest Republic representative, or mail coupon.



REPUBLIC PLEXIBLE PLASTIC PUPE GIVES YOU EXCELLENT SERVICE IN MICH. water handling applications. Made of tough polyethylene, it is easy to handle in cramped quarters and conforms readily to irregular contours. Light weight and easy cutting and joining simplify installation. Relocation to meet changing conditions ceases to be a problem. Republic Plexible Plastic Pipe is impervious to the corrosive elements normally found in mine water, assuring years of trouble-free operation. Mail coupon for further information.





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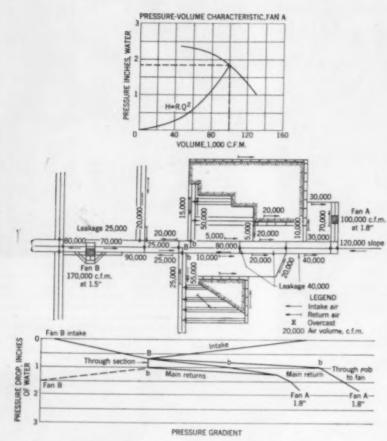


FIG. 1-NORMAL air distribution with two fans operating.

In mines employing more than one main fan it pays to know what effect a shutdown of one of the fans will have on air currents throughout the entire system. Here are some pointers from an expert on how to study the situation.

By D. S. Kingery, Chief Ventilation Section, U. S. Bureau of Mines Pittsburgh, Pa.

THE PRACTICE of utilizing two or more main ventilating fans is common with large coal mines throughout the industry. Such multiple-fan systems are necessary at many mines to assure adequate and efficient ventilation. The hazards associated with interrelated ventilating currents are controversial, and to date little effort has been made to study this specific problem and determine corrective

Based upon the author's presentation at the Coal Mining Session, Western Pennsylvania Safety Conference, Mar. 26, 1958. measures. The obvious questions are the following:

1. Is there a hazard?

2. Under what circumstances does it exist?

3. How serious is it?

4. What are corrective measures which should be taken?

Most mining men agree that reduced air quantities and changed air-flow patterns introduce potential hazards, especially with gaseous conditions, mechanized methods, and work concentrated in certain areas. The seriousness of the hazard will depend upon the ease with which methane can accumulate in face areas or along haulage roads, and the extent to which reversed air currents

## Integrating

would interfere with escape and recovery operations after possible mine fires or explosions.

#### Potential Hazards

The hazards are associated mainly with systems employing connected returns and without doors to prevent air from intaking through return shafts, as follows:

- A system employing multiple intakes may, by natural air distribution, develop neutral spots in intake air courses.
- 2. Interconnected fans operate in combination; consequently, a sudden change in one section could adversely affect airflow in others. How serious this condition may be depends upon local circumstances and the amount of methane liberated in the affected sections.
- 3. In the event of a local mine explosion or fire that changes the ventilation balance between fans, there is a greater possibility of reversed air currents, which may endanger the lives of escapees and complicate recovery operations.
- 4. If one fan is stopped, the following conditions very often occur:
- (a) Reduced air flow in certain sections.
- (b) Air short circuited from other sections.
- (c) Reversal of air in returns and possibly on haulage roads.
- (d) Possible flow from return aircourses to intake aircourses with specific conditions.
- (e) With reversed air flow in certain return aircourses, and dependent upon the physical conditions of the aircourses and the amount of pressure loss through sections, it is possible for section returns also to reverse direction, bringing return air to active faces.
- (f) Certain haulage roads may not be ventilated, other haulage roads possibly will be poorly ventilated.

These conditions may not occur in all instances, and by themselves may not be considered hazardous. How-

## Multiple Fans

ever, when combined with other variables such as operating conditions and practices, methane liberation, etc., they constitute potential dangers that the coal mining industry should endeavor to eliminate or minimize.

Figs. 2, 3 and 4 show the air flow adjustment that occurs when one of two fans is stopped. The simplified diagram represents part of a large coal mine that has four main fans. Air quantitities were based upon actual resistance factors, and for simplicity were calculated only to the nearest 5,000 cfm. The flow distribution patterns were checked in the Bureau of Mines electric analog and were found to be essentially correct.

### Normal air distribution with two fans operating (see Fig. 1).

Returns were not separated and no provision was made to prevent intake through return shafts.

Fan A was operating at 100,000 cfm at 1.8 in water gage. The pressure-volume characteristic is shown.

Fan B was operating at 170,000 cfm at 1.5 in w-g. The characteristic curves for Fan A and Fan B are different.

Air flow was induced by the combined fans from the Fan B intake and the slope intake, Fan A to the main Junction B.

Normal air leakage is shown. The north pillar section was ventilated with 50,000 cfm while the south section used 55,000 cfm. Parallel returns with relatively low resistance were provided to Fan A. Air traveled through the sections as shown and returned to both fans. Detailed flow to sections inby Fan B is not shown. The pressure distribution is shown by the pressure gradient and shows air flowing from Fan B inlet to point B, through the section, and returning to Fan B at 1.5 in of water pressure. Air flowed from Fan A inlet to point B, through each section, through gob, bleeder, and main return to Fan A, with a drop of 1.8 in of water pressure. This pressure gradient shows that the resistance factors for both intake and return aircourses for Fan B were higher than for Fan A. This is because of the shaft resistance and because there was one less intake

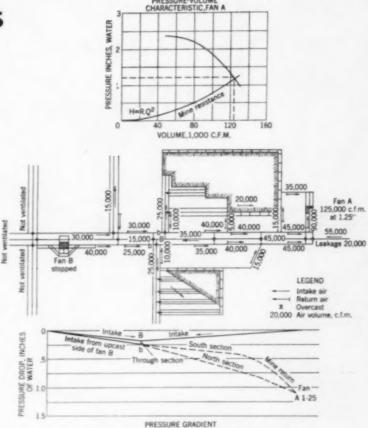


FIG. 2-AIR DISTRIBUTION with Fan B stopped.

entry and returns did not have completely parallel flow.

### Air distribution, Fan B stopped (see Fig. 2).

With Fan B stopped, air continued to enter the Fan B intake shaft; airflow was again to the main junction, but at reduced flow. Air available to the north and south pillar sections was about half that previously available. There also was an intake of 40,000 cfm through the Fan B return, causing a reversed flow in the returns between the air shaft to the return side of point B. Return air from the sections, plus this 40,000 cfm traveled the return system to Fan A, as shown. All sections inby Fan B were short circuited, as well as the haulage roads. Fan A now operated at 125,000 cfm and 1.25 in water pressure due to the change in mine resistance. The pressure drops across the gob areas and bleeder entries were in the same direction as before. Probably, no air would flow

from returns to intake with this set-up. The pressure drops are shown by the pressure gradient. This shows that with reduced flow the drop along intakes was about one-fourth that which occurred with both fans operating; while the drop through the returns increased, however, the total mine drop was less.

### Air distribution, Fan A stopped (see Fig. 3).

With Fan A stopped, air continued to flow from intake sources to point B. The quantity of air available to ventilate the pillar sections was approximately the same as that with Fan B stopped. Approximately 45,000 cfm entered through the Fan A return shaft. One split traveled the bleeder and gob of the north pillar section, the other paralleled the intake flow from the slope. Intake air from Fan B to the junction B was approximately as shown. The amount of leakage with such conditions determines the amount of air flow avail-

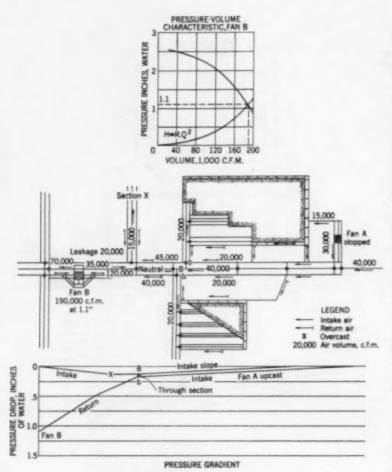


FIG. 3-AIR DISTRIBUTION with Fan A stopped.

able for sectional ventilation. The haulage road between section X intake, and point B, was neutral; however, there was no flow from return to intake aircourses. Sections inby Fan B were ventilated by approximately 70,000 cfm. Fan B operated at approximately 190,000 cfm and 1.1 in of water pressure. In the pillar sections, the pressure was from the gob and bleeder entries toward the faces, a condition that could be very hazardous. Between the intake and return aircourses and from the intake slope and Fan A return shaft, to the intake and return side of the main junction, the difference in pressure was very slight. This means that air flow probably was sluggish. If any openings existed between intakes and returns, such as leaky main doors and splits for ventilating shops and substations, return air probably would intermingle with intake air, depending upon the condition of the returns. With large gob areas open to the returns this situation could, during an extended fan stoppage, permit airgas mixtures to flow onto haulage roads and collect in high, unventilated spots. The pressure gradient was approximately as shown.

Air distribution Fan A stopped but with Fan A return blocked (see Fig. 4).

The air flow along the haulage road and at point B was approximately 65% of what it was with both fans operating. The return entries between Fan A and point B were neutral, reducing the hazard of gas from gob areas reaching the haulage road. The haulage road between section X intake and the main junction B had some intake flow. The pressure was not against the gob areas. The bleeder entries, however, would not be too effective and very little air would actually enter the gob. Air

would flow along gob fringes to return courses. Sections inby Fan b were ventilated by 75,000 cfm.

This illustration shows the advantages that are gained by installing self-closing doors to block the return sides of air shafts. Such doors constitute the most important single protective measure that can be taken with ventilating systems employing multiple main fans.

These illustrations give only the air distribution for the specific conditions shown, involving only two fans. Each mine, depending upon the number of fans, the distance between fans, whether fans are separated, and the mine development, operating, and ventilating practices, probably will have somewhat different air flow pressure relationships between fans.

This means that while there are general conditions applicable to all multiple main fan ventilating systems that may be termed potentially dangerous, the degree of the hazard will be determined largely by individual systems, operating practices, and the extent to which methane can become involved.

It is important that mine managements study their ventilating systems to determine what air distribution will result in the event of a fan failure. It is also necessary to prepare a plan of action to assure the maximum safety to men and the mine that can be carried out immediately after a fan stops.

In addition to the self-closing doors installed to block air from intaking through return exits, some companies separate their returns with additional doors. Separated returns add additional safety factors when more than two fans are employed since they definitely establish the direction of air flow. They also permit better control of air in large mines utilizing numerous fans. However, they should only be used in conjunction with selfclosing doors installed at return exits. Such separations are usually accessible slide doors or swinging doors that permit enough leakage to prevent dead ends and can be opened if desired.

#### Recommendations

1. Self-closing doors should be installed at all return exits to prevent

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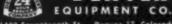
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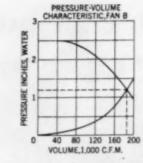
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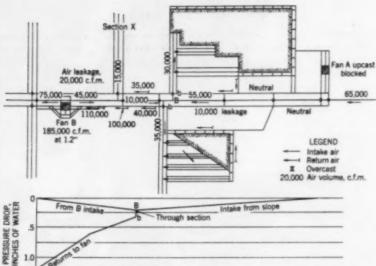
Over 95% of all coal flotation plants in the U. S. use Denver "Sub-A". Why not follow their lead? Case histories on request.





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PRESSURE GRADIENT FIG. 4-AIR DISTRIBUTION with Fan A stopped and Fan A return blocked.

air from intaking in the event of a fan failure.

- 2. To prevent dead areas in intake aircourses, it may be desirable to regulate certain intakes by limiting the number of entries.
- 3. In conjunction with self-closing doors, separate the returns, the location of doors to be determined by the number of sections and the work load of the fan ventilating the area.
- 4. Assign ventilation responsibility to someone who understands the mine ventilation, and knows what sections are influenced by individual fans. It may be desirable to stop one fan occasionally during idle days and determine by actual air measurement what the new air distribution will be. The hazards then can be evaluated and plans to minimize them promulgated.
- 5. Recommended operating procedure to be followed in case of fan stoppage is as follows:

- (a) Disconnect electric power from mine until examination is made to determine the extent of affected
  - (b) Withdraw men from mine.
- (c) Examine doors located at the return shaft bottom of the stopped fan; certify that they are functioning properly.
- (d) If doors are used to separate return aircourses, these should now be opened to connect returns and permit reduced intake air flow through the sections influenced by the fan failure.
- (e) If the fan remains down for an extended time, the mine should be examined daily for changing conditions that could become hazardous. Haulage roads particularly, as well as sections should be examined.
- (f) After the fan has been started, examine the mine with particular attention to haulage roads, pump stations, and substations as well as the face areas.
- (g) Record findings of the examination in the State Book.

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# To move 24-ton loads through deep mud they use GMC Diesels

a report from Frank Pride of Fletcher Trucking, haulers for Hart & Hart Coal, Providence, Ky.



PULLING THROUGH MUD THAT SOMETIMES SCRAPES DIFFERENTIAL HOUSINGS, Fletcher's GMC Diesels bring through every load in this off-highway operation. In summer, they work two 8-hour shifts a day - 6 days a week. Credit belongs to their 2-cycle Diesel power plants - unequaled for dependable high-torque output. "We never have any motor trouble. We like GMC's fine," says Frank Pride, superintendent of operations.

THESE GMC's MAKE TWO TRIPS FOR EVERY ONE an offthe-road vehicle could handle. They combine nimbleness and easy maneuverability with super-stamina more than equal to the rugged job.

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## See how they anchor this frog

This frog is part of a spiffy new track layout designed by Bethlehem for a West Virginia mine. Boasting 85-lb Bethlehem rail, the layout is modern to the last detail.

Notice the frog plates indicated by arrows on the illustration. Those are Bethlehem Hook Frog Plates, and they hold a frog in place far better than regular track spikes ever could.

The hooks are larger and stronger than any spike head, and because they are integral with the plate they distribute track motion over a broader area of the tie. Thus the spikes which anchor the plate are freed from direct pull, and both vertical and lateral thrust are effectively held in check.

Because these plates are used in pairs (two plates fit neatly on a tie), they can easily be adapted to any frog position or angle. And they elevate the frog to keep it level with the running rail.

A Bethlehem mine-track engineer will be glad to go over the full story of Hook Frog Plates with you, to show how they can improve your haulage and cut down maintenance. You can reach him through the nearest Bethlehem office.

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### BETHLEHEM STEEL





OLD METHOD of supporting boom required heavy U-bolt assemblies and equalizers. Four 4-in wire ropes held shovel boom in place and had to be replaced after some 2 to 4 yr of operation. Failure of ropes or connections was a hazard.

Hanna engineers apply research methods to develop . . .

## Better Boom Supports for Big Shovels

Strands replace wire ropes after thorough engineering study of boom-support problem. Attachment to boom and gantry is simplified.

A SAFER, SIMPLER METHOD of supporting the booms on Marion 5561 stripping shovels has been developed by the Hanna Coal. Co., Cadiz, Ohio. In the original design of these 45- and 50-cu yd machines, the boom was supported by four 4-in wire ropes of more or less standard construction. As a rule, these ropes began to show difficulties after a comparatively short life.

Not only was there the large cost of replacing these ropes, but the fatiguing, which was apparently taking place in the rope, was largely internal and not subject to visual observation. This, of course, created a definite hazard in that it was impossible to obtain a good evaluation of the rope strengths with the consequent liability that a rope would fail in operation. These cables were attached at the gantry end by an equalizer mechanism which would release the other rope of the pair, should one break; this in turn would throw a very high loading on the remaining two ropes which were then likely to fail and drop the whole boom with obvious disastrous results. It was found that there was considerable fatiguing of the equalizing and adjusting mechanism which, in itself, was a greater hazard even than the fatiguing of the wire rope.

#### Developing the Big Strands

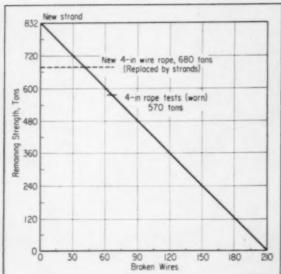
operating hazards involved, indicated that an engineering study should be made of the problem. On other machines, it had been found that strand construction of the support cables apparently gave good results. As an example, a 550-B Bucyrus-Erie machine was operating, at this same property, with boom support strands which had given a life of about 6 yr. This led the coal company to investigate the application of stranded construction to the larger shovel. By consultation with the engineers it was found that even with a reduction in cable diameter from 4 in, used on the conventional wire rope construction, to 3%-in diameter on strand construction that the cross sectional area would be increased and ultimate breaking strength of the cable would be increased from 680 tons to 830 tons. Since the wire ropes were showing signs of fatigue from overload, it was decided to try this arrangement. These 3%-in stranded cables are made up of 217 wires, each of which has a diameter of about 1/4 in. Since the cable was largely stationary, and did not pass over sheaves, it was possible to get by with this type of stranding which obviously is not nearly as flexible as conventional wire rope.

#### Early Strand Experience

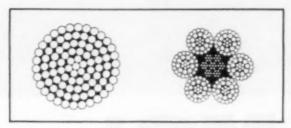
The first set of four strands was installed on one of Hanna's Marion 5561 machines in October, 1949. The first installation was not a complete success; however, it was apparent that strand breakage occurred on the outside instead of internally, as had been the case with the conventional wire rope. This, of course, meant quite a The cost of these rope replacements, as well as the safety factor as the strand condition could be evaluated



NEW GANTRY HITCH features individual anchors for each of four 3%-in strands having close length tolerances.



GRAPH shows how strength of 3%-in strand compares with 4-in wire rope and relation between broken wires and strength.



#### New method is simpler, safer

STRAND CONSTRUCTION, now used for boom suports, is illustrated at left. Rope construction is shown at right.

from visual inspection. Tests, conducted at Lehigh University, proved that remaining strength was in a direct ratio to the number of broken wires, which could now be easily counted on the surface of the strand. The increase in strand strength apparently greatly reduced the fatigue; however, there was some outside wire breakage at the sockets. This seemed to be related to socketing procedures, which were corrected. In addition to the socketing improvements, it was decided to pre-stress the cables to insure uniform loading of the strands.

The exact life of the strands is hard to evaluate as they are now up into a 5- to 10-yr life. A considerable period of time must now transpire before accurate life figures can be tabulated. With this long life, it is necessary to use galvanized wire for corrosion protection. This is working out satisfactorily as Hanna engineers are able to say that they have 8 yr exposure on some strands with little or no sign of corrosion. Since there is no paint or lubricant applied, visual observation of the cables is quite simple and positive. This, of course, would not be possible if the cables were painted or lubricated, as would be necessary with bright wire.

#### Better Strand Connections

While working on the strands themselves, Hanna was also making a study of the connection, equalizer and adjusting arrangements necessary at the cable ends. After study and consultation with the cable manufacturer, it was decided that the equalizer arrangement could be eliminated. During normal operation of the shovel, these support cables elongate several inches. The manufacturer can make these cables, with the socketed ends, to a length tolerance of plus or minus ¼ in. So it was calculated that this slight differential would not make a substantial difference in the loading of the cables without the equalizer. Also, it would be possible to eliminate the U-bolt adjusting mechanism.

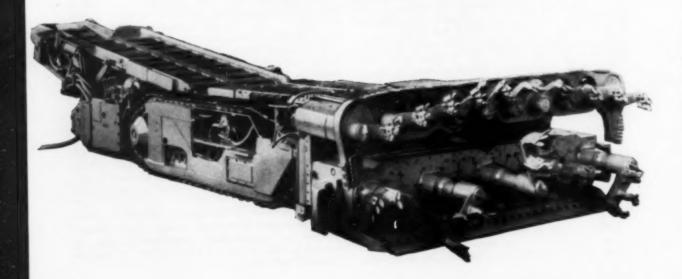
As mentioned before, both the equalizers and U-bolts showed signs of fatigue, and failure had proven to be disastrous. With this analysis, it was decided to eliminate all of these mechanisms and get the simplest possible connection from the cable to the boom and gantry. Photographs show the simplification made on these attachments. Operation of the revised units has been quite satisfactory and gratifying. It is felt that, in addition to the maintenance saving, a much safer arrangement has been developed, making each strand a complete support in itself. In order to drop a boom with this new design, four definite main parts would have to fail, while before only two had to break.

The development of the strands, and the improved method of support, is one more example of how Hanna's engineers and manufacturer's representatives have cooperated to solve a practical field problem and improve equipment performance.



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SAFETY SPARKPLUG J. L. Coyer, Republic superintendent, provides enthusiastic leadership in mine safety.



AWARDS for outstanding record include company and Big Sandy-Elkhorn Institute plaques, displayed in office.

21/2 yr without a lost-time accident is the pay-off for Republic's . . .

## Constant Accent on Safety

1,007,640 man-hours—and continuing—without a lost-time accident is the record made by mine employees of Republic Steel Corp., Elkhorn City, Ky. Everyday attention to safety is the key to such achievement.

"SAFETY IS AN EVERYDAY THING. You can't pass up anything, you must take care of any hazard right on the spot."

"Safety and production go hand in hand. The safe mine is the efficient mine. Show me a mine with a bad safety record and I'll show you an inefficient one."

These are the words of J. L. Coyer, superintendent of Republic Steel's Republic mine at Elkhorn City, Ky. Under his leadership, employees of Republic mine have worked 2½ yr without a lost-time accident and they are still going strong. From Nov. 1, 1955 through Mar. 31, 1958 employees have worked 1,007,640 manhours without a lost-time accident. And this record is being broken with each passing day.

How is enthusiasm for safety maintained at a high pitch day after day and year after year? First, top management believes in safety. Republic mine is in Republic Steel's northern mines group which is headed by J. H. Reitz, manager who not only is a staunch believer in safety but also passes his enthusiasm on to J. N. Hedding, general superintendent, C. C. Virgin, superintendent, industrial relations, and to men directly responsible for running the Republic's Northern coal mines.

Each year the company holds a safety award dinner for the mine with the best safety record for the past year. The mine also receives a company plaque. This affair is held at or near the town where the mine with the best record is located. It was at Republic Steel's annual dinner in 1955 in Pennsylvania that Mr. Coyer decided it was time for his mine to go all out for safety and

Bulletin: As we went to press, we learned that Republic mine had won this year's Sentinels of Safety Award in the national safety competition sponsored by the U. S. Bureau of Mines. The trophy is provided by Explosives Engineer Magazine, published by Hercules Powder Co.

win the company's bronze plaque.

By completing the year 1956 without a lost-time accident, employees of Republic's Kentucky mine did earn the company safety plaque and the annual award dinner was held in Kentucky, as Mr. Coyer has visioned.

#### Maintaining the Record

Getting all of the employees interested in safety and then maintaining that interest is difficult at any mine. Mr. Coyer says that the best way to maintain interest at a high level is to put safety on a personal basis and talk to the men individually at every opportunity. This enthusiasm for safety on the part of top management then filters on down through the ranks and each man assumes a personal responsibility for working safely on his own job. Each man knows that he must be responsible for his own safety once the company has complied with the Federal Mine Safety Code and the Kentucky mining law along with any special rules set up by Republic Steel. The men know that management does not want them to commit an unsafe act, consequently, they accept the responsibility and do their best to keep the record intact.

Aside from enthusiasm on the part



MONTHLY MEETINGS in company clubhouse keep all foremen alerted to general hazards in the Republic mine.



NEW IDEAS for preventing accidents and keeping interest in safety at a high level are exchanged at monthly meetings.

of management and workers, plus strict adherence to Kentucky State mining laws and safety regulations, mine management points out that roof bolting and participation in the USBM accident-prevention course also contribute to the no-lost-time accident record. Roof in all working places has been supported with roof bolts for the past 4 yr and the accident record has continually improved since then. Participation in the USBM accident-prevention course 3 vr ago taught the employees the fundamentals of safe working habits. Since then, management has been able to maintain interest in safety at a high level.

#### Safety Meetings

Regular safety meetings also are important in keeping Republic workers safety minded. For example, at the beginning of each week each section foreman holds a 15-min safety meeting on the section before any work is begun. These meetings deal with specific hazards in each particular section and in jobs of the various crew members. Thus a typical continuous miner crew may be cautioned about testing the roof frequently and setting safety posts as the machine advances. A general inside crew working on the third shift might be instructed in the following: safe handling of explosives, conveyor pans and rail; safe practices in handling feeder cable; precautions to take when moving continuous-miner junction boxes and power cables; a check of all men to see that they have safety goggles; and a warning to motor crews to see that lights are used on the rear of all trips.

After each underground meeting, the section foreman outlines on a special report form the topics discussed at the weekly meeting. This is signed and given to the superintendent for review and filing.

To keep all foremen alert to the general hazards at the mine, a general safety meeting of all supervisors is held once each month in the company's clubhouse. The meeting opens with Mr. Cover offering a number of important points for instruction, or correction. He pinpoints things he has noted as needing attention since the last meeting or that may be hazardous in the coming weeks. Under the leadership of Mr. Coyer, lost-time accidents in the previous month at all Republic Steel's coal mines then are reviewed and discussed. These are described in the news bulletin published each month by Republic. State reports of fatalities in Kentucky also are studied at these meetings and ways of preventing similar accidents are discussed.

After the accident reports are analyzed the floor is open to discussion of any specific problems by the individual foremen. Each man is given an opportunity to explain his problem and how he believes it can be solved. All the men gain from this exchange of ideas and are better enabled to handle similar situations if and when they arise on his section.

To learn more about how management keeps interest in safety at a high level and prevents accidents, a Coal Age editor attended one of the monthly safety meetings. Here is a summary of what took place.

About 15 min before meeting time, 10 am Saturday morning, supervisors began gathering in Republic's clubroom. While waiting for the meeting to start, the men gather in small groups to talk shop while enjoying premeeting refreshments provided by the company.

At 10 o'clock sharp, Mr. Coyer calls the meeting to order and after opening remarks he leads into a series of safety topics and pinpoints pitfalls to avoid in maintaining Republic mine's perfect record. In brief, the 2-hr meeting included discussion of the following points:

Regulation of speed of locomotives and other units. The need to maintain a 500-ft interval between locomotives.

The importance of keeping mine personnel carriers in top operating condition.

 A review of Republic's timbering standards with special emphasis on roof support on pillar lines.

Instructions in safe mining procedure in pillar work.

A review of Republic's standards for rockdusting and ventilation.

6. Instructions in the proper method of splicing trailing cables.

Achieving safety through wholesome cooperation of all employees.



WEEKLY MEETINGS are held before men start work. Here, section foreman Rufus McKee leads discussion of possible hazards.

- 8. Proper practices in handling break lines.
- Special emphasis on examining working places, especially ribs and roof.
  - 10. The danger from overhangs.
- Review of safety material in the current issue of Northern Coal Mine News.
- 12. Discussion of the lost-time accidents in the district.
- 13. Study of the no-lost-time accidents at Republic mine.
- 14. Special instructions in the safe way to clean a belt conveyor.
- 15. Reemphasis on the value of constant reviewing of safety rules set up by the federal and state departments of mines.
- 16. Hazards of horseplay around the mine.
- 17. Dressing for safety, including proper work clothes, goggles and leg bands.
- 18. A review of basic procedures in giving first aid, with emphasis on the proper handling of injured employees, especially if bones seem to be broken.
- Round table discussion on how to continue Republic mine's current safety record.

#### Round Table Ideas

At the windup of the safety meeting Mr. Coyer asked each man to offer a constructive suggestion for maintaining the perfect record. Here is what the men said: Guy Raliff: Give more attention to the details of safety, with special care in setting safety timbers, ventilation, handling electricity and handling explosives.

Ray Hylton: Take extra safety precautions while mining pillars. Foremen must be diligent in examining working places and pay special attention to loose ribs.

Landen Slone: Weekly safety meetings pay off. A constant followup on instructions, and repeating instructions plus warnings keep men alert. Make a personal study of each man to learn as much as possible about his work habits and personality.

Eddie Rowe: Check all working places closely. Be constantly on the alert for hazards. Use plenty of roof support.

Ted Simpkins: Instill in the minds of all workmen the idea of safety. One way of doing this is posting the number of accident-free days in a prominent place. Men are interested in this record.

Rufus McKee: Safety comes from the top management and passes on down. Try to get this idea across to the men. If top management is interested, the men should be, too. When the men do a good job, be sure to compliment them.

Joe Burgess: Remind the men about the correct way to handle steel rails. Caution them about the danger of handling explosives near electrical equipment or pipelines.

Earl Bartley: It's a good idea to

keep talking safety. If you see a man doing something wrong, remind him about it immediately and get him interested in why it is unsafe. He will soon get in the habit of doing it safely.

Elsworth Rowe: Make a close observation of the work habits of each man. Call attention of each to any bad methods. Keep reminding them that if it isn't the safe way, it isn't the right way.

W. W. Moore: Safety can be achieved only through the teamwork of all employees.

Dan Thacker: Know the work and off-work habits of your men. Watch for tendencies toward accidents in each worker.

Tom Davis: Each foreman must constantly talk, live, practice and set an example in safety.

Archie Elkins: Good housekeeping is important. Mechanics should inspect their tools more frequently. Every so often a mechanic should empty his tool bag and check all tools. Remind the men that the right way of doing a job is not always the fastest way, but it does promote efficiency in production and safety.

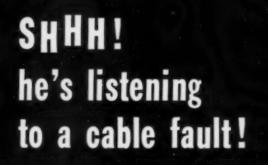
Raymond Ratliff: Exercise care in continuous mining areas where speed of production may cause laxness. Safety timbers are important and always make sure that temporary aluminum crossbars are set ahead of the roof bolter.

Clyde Bracy: Good housekeeping, caution in welding practices and making sure to lock out all equipment before it is serviced are important. Keep reminding car droppers to wear safety belts.

Elmer Coyer: Instruct new men carefully. Foremen should caution men on the hazards of a job when they are changed from one type work to another.

C. H. Prown: Continue to exercise care in record keeping. It helps in the safety program.

Mr. Coyer is high in praise of the efforts of all foremen and employees in maintaining the no-lost-time accident record. He says that it is their record and they are the ones who will keep it. Looking into the future, Mr. Coyer says that the record will be more difficult to maintain with each passing day, but if there should be an accident his men would be ready to start a new campaign to better the previous record.



#### with the O-B Fault Locator

Because they're so hard to find, hidden cable faults often cause more lost production, more wasted man hours — more wasted cable, in fact — than the big faults that rupture insulation and actually destroy

cable. That's why you'll find more and more mine properties today investing in O-B Cable Fault Locators, in many cases using as many as 10 Locators on a single

Powerful, compact (you can carry it in your pockets), rugged and virtually "tamper-proof," the O-B Locator pinpoints in a matter of minutes cable faults that would ordinarily take hours to find. The complete unit weighs only four pounds and consists of just four elements: battery and signal generator (being attached to cable end below), and headphones and slim transistor receiver. The latter, as shown above, are the only parts carried along the cable during testing! Takes only minutes to set up, tests cable up to 600 feet or longer, costs less than any cable you'll use it on! Write for complete information, or order Catalog No. 22567 to try it out for yourself.

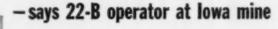
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## "Less maintenance problems with BUCYRUS-ERIES... less downtime, more pay hours for me!"



"I've had experience with Bucyrus-Eries and several other makes," says Wayne Zeck, Knoxville, Iowa, who operates a 22-B coal loading shovel for Beard Coal Company. "I've found that you have far less maintenance problems with Bucyrus-Eries. That means less downtime and more pay hours for me."



## MORE OUTPUT, too, for Owner, Byron Beard

"Bucyrus-Eries prove as good as you expect them to," states the veteran strip miner whose Flagler mine has been in operation since 1934. His 22-B, equipped with 1 %-cu. yd. coal loading dipper, loads coal during an 8 1/2 -hr. shift. "Engineeringwise, this 22-B is a swell machine. I like the machinery layout, and I especially like the power system for its long life with little maintenance!"

You can enjoy the same low upkeep, high output pit operation. With a Bucyrus-Erie 22-B shovel, you get more working time each hour of every shift - more daily output - because:

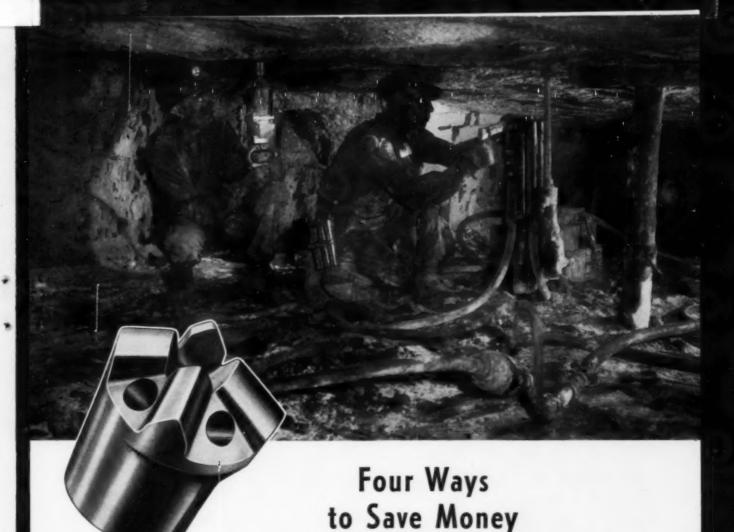
It stays on the job. It's built tough. Quality materials provide strength, durability, allweather stamina. Parts are simple, large, few



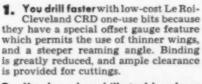
in number - there is little that can go wrong. Machinery is arranged simply, compactly so that maintenance can be handled quickly with little downtime. It's easy to keep a Bucyrus-Erie going at top speed. Exceptional synchronization of speeds and power assures smooth, well balanced work cycles . . . fast, responsive controls.

Stop in and chat with your nearby Bucyrus-Erie distributor. He'll gladly give you the complete story on the popular 22-B, or any other model — ranging from % to 4 cubic yards.

A Familiar Sign... BUCYRUS .. at Scenes of Progress







2. You have less drill-steel breakage with Le Roi-Cleveland CRD one-use bits. The method of bit attachment eliminates threads on the drill rod. And since a drill rod is only as strong as the root diameter of its threads, the tapered, threadless CRD's give you a stronger, power-saving union, and longer drill-steel life. Other savings result from reduced handling and reconditioning costs.

You have less wear and tear, too. Rifle bars, rifle nuts, and chucks will last longer because CRD's are designed to reduce binding and ease strain on rotation parts of your drills.

4. They cost less, initially. CRD's cost less than 25¢, half as much as comparable multiple-use bits. There's a big saving in time and labor spent handling bits, too. CRD's knock-off, throwaway use eliminates unscrewing, and all the time-consuming traffic between operator and bit shop.

It costs practically nothing to try them. You don't need to invest in special threading or reconditioning equipment when you use Le Roi-Cleveland CRD one-use bits. Satisfy yourself that they can save you money. Get a can today, and start cutting your drilling costs right away.



Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationcry air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

with CRD One-Use Bits



FIG. 1-COAL PREPARATION PLANT at East Fredericktown, Pa., seen from Vesta mine end of suspension bridge.

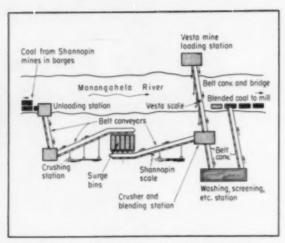


FIG. 2-SCHEMATIC FLOW DIAGRAM for the Vesta-Shannopin continuous coal proportioning system.

## **Electronic Conveyor Controls**

Two conveyor coal flows are mixed in the correct proportions under the control of an automatic electronic system which varies the speed of one belt so as to maintain a pre-set feed-rate ratio between the two flows.

THE PROBLEM of combining the outputs of the Vesta and Shannopin mines of the Jones & Laughlin Steel Corp., East Fredericktown, Pa., to produce a uniform high-quality coal for coke production has been solved by installing an automatic electronic continuous coal proportioning system. Output from the Vesta mine is conmeasured electronically and this controls the flow-rate of the Shannopin coal. The two coals travel to a junction point on conveyors where they mix in the correct proportions.

The Vesta and Shannopin coal provides most of the coke for J. & L. plants at Aliquippa and Pittsburgh, Pa. After mechanical loading facilities were installed during World War II, the Vesta-Shannopin operation was enlarged to include complete preparation facilities making it the world's largest coal preparation plant.

Prior to the installation of the continuous proportioning system, coal from both mines was transported in barges down the Monongahela river directly to the mills, where it was mixed. It was decided that the entire operation could be streamlined and operated more economically by mixing the outputs of the Vesta and Shannopin mines at the East Fredericktown preparation plant, then transporting the mixed coals by barge to the mills.

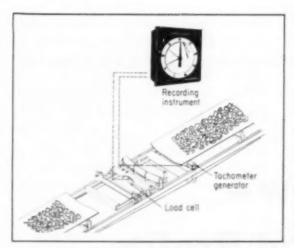
#### The Control Problem

A simplified flow diagram for the two types of coal up to their junction point is shown in Fig. 2. Vesta coal is unloaded into a common hopper by two rotary dumps on the mine side of the river. After initial screening and crushing at the dump, the coal is brought to the surface and conveyed across the river on a 2,000-ft-long belt on a suspension bridge. Average rate of output is 1,300 tph. There is little storage capacity in this phase of the coal flow, which makes it impractical to provide minute-to-minute control of the Vesta coal flow.

Coal from the Shannopin mines upstream is unloaded from barges as shown and transported by belt conveyor to 10 bins having a total capacity of about 5,000 tons. Ample storage capacity is provided to permit two-shift operation of the preparation plant with one-shift unloading of the barges. Each bin is equipped with a belt feeder. A collection belt carries the Shannopin coal from the feeders at an average rate of about 600 tph to an inclined conveyor that in turn transports the material to the junction with the Vesta coal flow. The resulting mixture of Vesta and Shannopin coals is then conveyed to the preparation plant for final processing.

It was necessary to somehow control the relative coal flows from the two mines so that a specified proportion of Vesta coal to Shannopin coal was always maintained. Since the Vesta flow was not easily controlled, the Shannopin flow was chosen as the place for achieving the correct proportion between the two coals. Automatic proportioning was of course desirable on a number of counts, and automatic electronic equipment engineered and built by the Trans-Weigh Co., King of Prussia, Pa., was installed.

A typical basic Trans-Weigh measuring system is illustrated in Fig. 3. This system measures the weight of coal on a short section of the belt, and also the belt speed, and then multiplies these two variables electronically to obtain the pounds of coal per hour being delivered. The



eter generator, load cell and recording instrument with the belt.

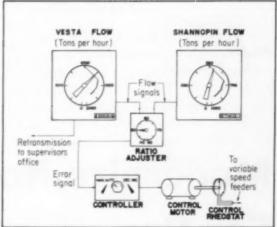


FIG. 3-BASIC MEASURING SYSTEM consisting of tachom- FIG. 4-SEQUENCE DIAGRAM schematically showing automatic steps in control process and the instruments used.

three primary components of this system are: (1) an electric tachometer generator driven by the return belt which measures belt speed and supplies current to the weighing system; (2) an electric strain-gage load cell which measures the belt load; (3) a specially modified electronic potentiometer which indicates and records instantaneous rate of coal flow and also includes an electronic "integrator" which displays total coal tonnage on a small counter.

#### Vesta-Shannopin Answer

In the Vesta-Shannopin coal proportioning system, the Vesta flow is detected by a Trans-Weigh scale comprising a load cell and a tachometer generator located part way across the bridge, while the Shannopin flow is measured by a similar scale located immediately after the loading point on the inclined conveyor. Both the Vesta and Shannopin feed rates are transmitted to a central station near the junction point.

Automatic proportioning is accomplished by the following sequences (Fig. 4). The operator sets the desired ratio of Shannopin to Vesta flow by a calibrated dial adjustment on the ratio adjuster. The ratio adjuster receives flow signals from the flow recorders proportional to actual measured coal-feed rates. These measured and desired feed rate signals are compared electronically and the difference is an error voltage which goes to the controller. The



FIG. 5-PLANT ENGINEER, H. E. Steinman, adjusting the feeder speed at the master control panel of the coal proportioning system.

controller, through a motor and rheostat, then increases or decreases the speed of the Shannopin bin feeders to bring the error voltage back to zero. Speeds of all feeders are controlled by one rheostat, but up to five of the 10 feeders may not be in use at any one time.

Location of the two flow rate detecting devices is such that the time lags for changes are equal. Thus, when Vesta tonnage varies, the control system immediately affects a proportional change in the Shannopin feed rate, and the two changes meet at the junction point at the same time. Vesta output and totalized tonnage

are also retransmitted to a duplicate instrument in the superintendent's

If the conveyors should stop, the control motor is driven to the lowspeed position by an interlock. The control is left on automatic and when the system is restarted the controller automatically brings the Shannopin feed up to the correct value without overshooting.

#### Performance and Benefits

The continuous coal proportioning system has more than fulfilled its designers' hopes. Continuous time-scale charts plotted by the two flow-rate instruments show that the Shannopin feed faithfully follows the ups and downs of the Vesta feed. Even 10% variations in 10 min time, and peaks of 25-30% have not caused trouble.

Not only was the original problem of providing a uniform high quality mixture solved, but secondary advantages have appeared. The system is so completely automatic that the operators do not have to switch to manual control when stopping or starting the conveyors. In addition, simplified supervision of the system comes from the location of an additional recording and integrating instrument in the superintendent's office.

The automatic electronic continuous coal proportioning system is proving in action the benefits of applying modern technology to the coal industry's problems.



## Modernize Now – For Growth and Profits

The biggest challenge facing American industry today is that of thoroughly modernizing its plant and equipment. This is the test period for companies to prepare for success—or failure—in the '60s. Success depends decisively on one key policy—modernization, for growth and profits.

The problem of business recession is fading. Sales and industrial production are moving up again, slowly. Business is swinging back into its normal course. This is growth, not retreat and recession. If the recovery takes us back to the normal growth trend, industrial production will be up 15% to 20% by 1960.

But how can we get this growth in production without the plague of price inflation that has blighted our economy in recent years? And, of fateful consequence for the individual business firm, how can it keep its costs down enough to make a decent profit — something a very large share of American companies are not doing today?

This is the new challenge that confronts business as the recession is left behind.

#### Nature of the Challenge

The recent record on costs and productivity is not reassuring. Since 1947 wages in manufacturing have risen 68%, while output per manhour has gone up 32%. This is a dismal record for a nation that has prided itself on

gains in industrial efficiency. Clearly, if we are to avoid continuing inflation, labor must key its wage demands more closely to productivity increases. But clearly, also, we must do far better in raising output per manhour. Otherwise, industry cannot hope to offer stable prices, and still make a profit.

What, then, is the answer? It is modernization of plant and equipment, the replacement of obsolete producing facilities with new and more efficient machinery and buildings. Only in this way can industry hope to increase production, hold down costs and make a good profit showing in the years of growth that lie ahead.

#### Industry's Answer

The chart on the preceding page shows how American industry is buckling down to the task of modernizing its facilities over the next four years. It is planning to replace old equipment with new machines that will raise output per worker not just 2% or 3% a year, but more like the 5% annual gain in productivity that this nation achieved in the years following World War I.

Since World War II we have had to contend with shortages of capacity and materials that have held back the job of raising productivity. But today the machines and techniques are available. And industry is getting set.

A broad sample of manufacturing companies surveyed by the McGraw-Hill Department of Economics earlier this year reported these plans: In 1958, expenditures for modernization will rise to 56% of total investment in new facilities — compared to 48% in 1957. And this emphasis will increase until by 1961, expenditures for replacement and modernization account for two-thirds of all capital spending by manufacturing companies. In dollar terms, manufacturers will spend more on modernization in each of the four years 1958-61 than in any previous year except 1957.

#### Can It Be Done?

These are big plans. Can they be carried out? Is it too visionary to hope that after a decade of expansion, industry can now find the outlets for huge amounts of capital investment in the area of modernization? The answers are important to business and the nation, because on this new wave of modernization depends our hope of holding down costs and prices, and also the prosperity of the vital capital goods industries — generators of boom and bust in our economy.

To ensure that industry gets the answers, McGraw-Hill's 34 business publications are now starting a coordinated effort—the largest editorial effort in the history of our company—to find, report and publish the opportunities for modernization at a profit, in the fields we serve. These special reports will begin in late September and will run through November, with appropriate coverage for the specific needs of each field. We are proud to share with industry the responsibility for making sure that no opportunity is overlooked in the drive to modernize now for growth and profits.

This message was prepared by the McGraw-Hill Department of Economics as the first step in our company-wide effort to report on opportunities for modernization in industry. The Department is also preparing a longer report, on modernization as a national problem, for publication in October.

Permission is freely extended to newspapers, groups or individuals to quote or reprint all parts of the present text.

Donald CMc Graw PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

## Big Paul digs and dumps

78-yard dipper and handle, crowd rack, half and sheave blocks-all built stronger and lighter with USS "T-1" Steel.



## 105 tons in 50 seconds!

## USS "T-1" and TRI-TEN Steels cut dead weight—boost strength

Big Paul, the King of Spades, is another of the world's biggest shovels. There are three of these 70-yard giants—all were built by Marion Power Shovel Company. All achieve strength and toughness with least weight by the use of USS "T-1" Constructional Alloy Steel and USS TRI-TEN high-strength low-alloy steel.

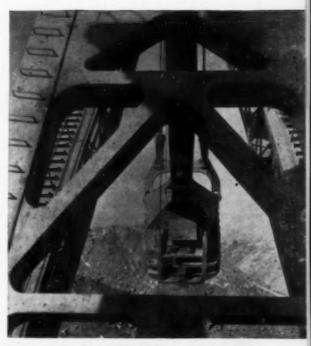
Big Paul sets the pace at the Peabody Coal Company's River King mine near Freeburg, Illinois. It rams through rock and shale to uncover some two million tons of coal per year.

Since 1950, the art of big shovel making has increased dipper size from 35 to 45, 55, 60, and now 70 cubic yards per bite. Most of these giant dippers are made entirely of USS "T-1" Steel, for it would be almost impossible to make them light enough and tough enough, otherwise. They hold up in this service, taking terrific impact abrasion and shock loading, even in the dead of winter. This is because USS "T-1" Steel retains its amazing toughness at temperatures for below zero.

USS "T-1" Steel has often enabled a boost in the capacity of original equipment without increasing size or weight. For example, a 20-yard bucket was replaced with a 24-yard "T-1" job. Other dippers were boosted from 26 yards to 32; and 36 yards to 45—increases of 25%.

Many other parts—dipper stick, bail handle and crowd rack—are built stronger and lighter with this 90,000 psi minimum yield strength constructional alloy steel. (USS "T-1" Steel plates are now available with a minimum Y.S. of 100,000 psi.)

The booms and A-frames of most shovels over 45 yards are designed with high-strength low-alloy steels with 50,000 psi minimum yield point...usually USS TRI-TEN Steel.



Boom crowd handle and welded A-frame are made of USS TRI-TEN high-strength low-alloy steel.

Perhaps you need a steel that offers higher strength, extraordinary toughness and resistance to impact abrasion, combined with ease of fabrication. USS "T-1" Steel is your answer, and we'll gladly help you adapt it to your application. For free booklet, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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United States Steel Supply - Steel Service Centers
United States Steel Export Company





STRIPPING, COAL RESERVES, INSULATION—H. W. Carey (left), River Queen Coal Co.; R. T. Taylor, Peabody Coal Co., St. Louis, Mo., association president; J. W. Huddle, USGS, Lexington, Ky.; Dr. F. D. Peterson, vice president, University of Kentucky, Lexington, Ky.; D. E. Buchanan, director, industrial development, Kentucky Utilities Co.; and William Schneider, Westinghouse Electric Corp.



MAGNETIC AMPLIFIER, 7,200-V CA-BLE COUPLER-C. deV. Miller (left), P. L. M. Products; H. W. Gorman, General Electric Co., and Dr. E. M. Spokes, University of Kentucky, session chairman.

Open Pit Mining Association Electrical Division studies . .

### Better Materials for Strip Mines

RIVER QUEEN MINE, Kentucky coal deposits, insulations, the magnetic amplifier and a new 7,500-V 300-amp cable coupler were keynotes at the one-day meeting of the Electrical Division of the Open Pit Mining Association's 14th annual meeting at Lexington, Ky., June 10.

Nearly 200 chief electricians, electrical engineers and manufacturer's representatives assembled at the University of Kentucky, to participate in the sessions. Dr. Frank D. Peterson, vice president, business administration, University of Kentucky welcomed the group and D. E. Buchanan, director, industrial development, Kentucky Utilities Co., served as master of ceremonies. Dr. E. M. Spokes, professor of mining engineering, University of Kentucky, was session chairman.

New officers elected for the coming year are as follows:

President-David Flota, electrical engineer, Sahara Coal Co., Harrisburg, Ill.

Vice President-Vernon Hendrickson, electrical engineer, Pittsburg & Midway Coal Co., Madisonville, Ky.

Secretary-Treasurer-L. E. Briscoe, electrical engineer, Ayrshire Collieries, Indianapolis, Ind., reelected.

Following are abstracts of papers.

River Queen Mine, Harry W. Carey, electrical engineer, River Queen mine, Peabody Coal Co. River Queen mine went into production in November, 1957. The operation is unusual in that two seams are stripped simultaneously with a Bucyrus-Erie 1650B shovel with a 55-yd dipper. Other pit equipment includes a 50R overburden drill, and a Marion 4161 coal shovel.

Power is delivered to the property at 33,000 V and divided into two circuits. One serves plt equipment and terminates at a General Electric 3,750-kva portable substation. All auxiliary equipment on both sides of the unit is mounted along with it on one large skid. Total weight is 15 tons.

Secondary voltage is 4,160 and is distributed over 250,000-cir mil mine power cable, purchased in 1,000-ft lengths. Disconnect houses are skid-mounted. Power for the shovel is carried by 4/0 cable and No. 4 or No. 6 cable is used for drills and other auxiliary units.

The second 33,000-V branch serves the preparation plant and shop. Power for the preparation plant is reduced to 440 V by a 2,000-kva transformer bank. A second substation cuts voltage to 4,160 for the shop.

There are four Westinghouse control centers in the preparation plant, which has slightly over 2,000 connected horsepower. Coal loading into 100-ton cars

A Special COAL AGE Staff-Written Report is handled by one man who controls a car-haul and all loading chutes from a central point over the tracks. Barge-loading methods are similar to those at Gibraltar mine (Coal Age, October 1956, p. 60).

Coal Deposits of Kentucky, Dr. J. W. Huddle, U. S. Geological Survey Office, University of Kentucky, Lexington, Ky.

The USGS has recently completed a study of the coal reserves of eastern Kentucky. Campbell's original estimate, made in 1913, was too liberal. The new study divides reserves into those 14 to 28 in thick, 28 to 42 in and over 42 in. Coal also is described as measured, indicated or inferred, depending on the information available. The new study shows 33½ billion tons of coal reserves, but some of it thin and unminable. As a result of the study, there are new ideas regarding the extent of many coal beds. There are 190 bed names recognized in 15 major coal beds.

Efforts to locate new minable areas of coal in eastern Kentucky should be concentrated in Pike, Knott and Perry Counties. The new study shows only 8 billion tons of coal reserves in eastern Kentucky with a thickness of 42 in or more. Reserves in the western part of the state are about 50 billion tons, only about 25% under the original Campbell estimate.

Electrical Insulation for Rotating

Equipment, William Schneider, engineering manager, apparatus repair, Westinghouse Electric Corp.

Insulation developments not only had to keep pace with the normal advancements in the electrical industry as newer and larger machines of higher voltage ratings were developed but also had to meet the more strenuous requirements which were imposed upon it by the users. Developments in the chemical, resin and electrical industries have enabled the designers to successfully keep pace with other developments and to meet the increasing severity of service conditions.

Among the significant new insulating materials developed in the past 20 yr are fibrous glass, silicone resins, polyesters, epoxies, polyethylene, melamines, fluorocarbons, polyurethanes and others.

Outstanding among the developments are the co-polymer solventless resins which make it possible to build homogeneous insulating barriers which are essentially void free. These barriers have high dielectric strength, excellent voltage and thermal endurance, and provide complete isolation of electrical conductors from atmospheric contaminants. Experience with these has opened up new fields and lead the way to further progress in the design of insulation. Future insulations will require less space, will be physically stronger and will be more stable thermally.

The development of fiberglass reinforced plastics during the past 10 yr has made available materials which can be used to band armatures without incurring the hazards to electrical security found in metal bands. These materials not only have the strength and mechanical advantages of steel bands, including that of application under required tension, but also have the added advantage of being insulators and non-magnetic.

The Magnetic Amplifier, H. W. Gorman, electrical engineer, General Electric Co.

Today's giants in open-pit mines have a continuous rating of 1,800 hp for the hoist motor alone, while under impact conditions as much as 6,000 hp may be delivered. Total installed horsepower is in excess of 5,000. To assist the operator in accurately controlling such huge quantities of digging power, we have applied one of the more recent developments of the electrical industry, the magnetic amplifier.

Accurate control of available horsepower requires a fast-response, highpowered regulating system. In addition to the increased power thus made available, greater acceleration and shorter cycle time are achieved. High shock loads on the boom and wire ropes are reduced by better current-limit control. More effective utilization of motor and generator capacity are realized by being able to work closer to their commuting limit without excessive current overshoot and possible flashovers. The static magnetic amplifier has been used in such a manner as to produce a system capable of these advantages and at the same time reduce the maintenance problem through use of fewer interconnecting wires and fewer rotating machines. The General Electric design for magnetic amplifiers is called the Amplistat and is defined as a self-saturating magnetic

Magnetic amplifiers stand ready today to be used as one of several new tools to:

- 1. Improve shovel performance
- 2. Provide increased digging power
- 3. Reduce operator fatigue
- 4. Reduce down time for maintenance

New 7,500-V 300-Ampere Cable Coupler, C. deV. Miller, president, F.L.M. Products, Inc., Cleveland, Ohio.

Metal-enclosed 5-kv connectors have been available for some time but this new 7.5-kv 300-amp portable cable connector is the first metal-enclosed connector with this rating. The electrical and safety requirements are about proportional to the square of the voltage, so there was a lot more required than minor modifications when the voltage was increased 58%.

The design is simple, the construction rugged and it embodies many safety features. Simplicity of design is achieved by combining into a single piece pressure-molded, glass-reinforced polyester molding the contact supports and the nesting tubes required to get the necessary creepage distance to take the 7.5-kv power.

When the casting parts are assembled they have a protruding circular flange. Mounted around the flange is a threaded closure ring which, when run onto the threads of the socket housing, pulls the plug into the socket. When it is backed off it pushes the plug out of the socket.

Before any contact can be made the closure ring has to be run on to the socket six or eight turns, mechanically locking the plug and socket together. The first contact made is the ground, which is fully in before any phase contacts are within arcing distance. Then the phase contacts engage. Lastly, when the coupler is within 1/4-in of complete closure the ground-continuity-check circuit contact makes.

Both the plug and socket housings can be arranged for switch gear mounting by substituting a mounting flange for the long end bell. Also the coupler can be skid mounted for furnishing 2-, 3- or 4-way plug and socket assemblies. So far we have been able to meet every mounting and circuit requirement given to us.

#### Idea Forum

Accent on Maintenance, H. F. Mc-Cullough, General Electric Co.

We must look at maintenance from the viewpoint of management and remember that the job must make money. Down time cost is high and one of the production.

Maintenance in the future will be even more important. Now is the time to look at ourselves so that we can grow with the economy. In the final analysis, the maintenance man is fast controlling production.

Chrome Plating, R. G. Rettig, General Electric Co.

Hard chrome plating is used extensively in engine repair work, specially on crankshafts and cylinder linings. Metalizing also is used to reduce the cost of repairing equipment.

Advantages of chrome plating are:

- 1. Hardness of the finish
- 2. Resistance to heat
- 3. Resistance to corrosion
- 4. Resistance to wear
- 5. Low coefficient of friction

The cost of chrome plating is justifiable if there is continuous wear of a shaft. It can result in a real saving if a shaft has many machined surfaces.

Use of Booster Pumps for Refuse Pumping, E. J. Dress, Sunnyhill Coal

Barrett-Haentjens 10-in pumps are used in series to move 2,600 gpm a distance of 2,000 ft. Approximately 160 tons of jig refuse are pumped by these units. Total dynamic head is 415 ft and pumps are driven by a total of 500 hp.

To get maximum life, pipelines are rotated 180 deg. A partition was placed in the intake line near the point of intake to the pump, to decrease wear in the pump itself.

Portable Cable Handling Equipment, Lloyd Hartley, Hanna Coal Co.

Our thoughts were turned to mechanical methods for handling cable after we began using larger cable to avoid overheating and prevent power loss, and after we discontinued using overhead transmission lines in favor of cable.

Several types of power devices tried before the present unit was developed. The original truck-mounted power red operated by taking power from the truck motor. The latest model power reel is driven by a 10-hp engine and has an emergency safety shut-off.

The reel is made of 1 1/2-in pipe and 3-in channel, and has a 25-in diameter. It can hold 3,000 ft of No. 4 cable, 1,500 ft of 3/0 mine power cable, 1,000 ft of SHD cable and 1,000 ft of 250 MCM.





ROOF CONTROL, VENTILATION-T. J. Liddie (ieft), Stonega Coke & Coal Co.; H. J. Dusz, institute president; D. S. Kingery, USBM; C. H. Hoch, National Safety Council; B. H. Schull, session chairman; C. A. Purcell, Indiana Bureau of Mines and Mining; W. R. Cunningham, Pennsylvania Department of Mines and Mineral Industries; E. E. Quenon, Peabody Coal Co.; C. E. Linkous, Island Creek Coal Co.; G. R. Higinbotham, Mountaineer Coal Co.; and J. M. Malloy, Oklahoma Dept. of Mines.

Mine Inspectors' Institute meets in Denver to discuss . . .

### Mining Progress and Safety

ROOF SUPPORT METHODS across the nation, better face ventilation, mine fires and explosions, AC power and shaft sinking were major topics at the 48th annual convention of the Mine Inspectors' Institute of America at Denver, Colo., June 23-25. Over 230 members and guests from 26 states attended the annual meeting. Abstracts of all technical papers follow.

#### **Roof Support**

Outstanding Features of Roof Support—In Pennsylvania, W. R. Cunningham, Deputy Secretary of Mines and Mineral Industries, Commonwealth of Fennsylvania, Harrisburg, Pa.

In 1954 the Pennsylvania Department of Mines instituted a roof-fall program both in the anthracite and bituminous divisions. Briefly the program included the following:

 Each program director investigated all roof-fall fatalities in his assigned area.

He reported directly to the Secretary of Mines his findings and recommendations.

He studied various roof-support methods and gave the benefit of these studies to each mine inspector.

One of the most disconcerting lessons learned through the study had to do with the method and manner of accident investigations. Without exception, fatal accidents were investigated thoroughly and completely. Lost-time accidents, however, revealed a much different story.

On occasion, the Department of Mines

and Mineral Industries has been accused of being opposed to roof bolting. This is emphatically untrue. We feel that roof bolting has a definite place in the mines of Pennsylvania. In most instances this system has been extremely successful. We recognize and encourage this success.

In Indiana, C. A. Purcell, director, Bureau of Mines and Mining, Terre Haute, Ind.

Practically every known method of roof support is used in some degree and what works in one mine, or part thereof, will not be successful in the same conditions in another. I think roof bolting, with all its failures, has been the greatest advancement in roof control in the history of the industry in Indiana.

Roof bolts have several advantages over other methods of roof support. First they can be installed immediately after the coal is removed and not be in the way of the next operation. Thus they protect the face area where the greater percent of roof-fall accidents occur. Bolting also gives equipment more freedom of movement, all the way from the face to the outside. Roof bolts, in my estimation, have done for roof control what the carbide lamp did for illumination more than 40 yr ago.

In Virginia, T. J. Liddle, director of

safety, Stonega Coke & Coal Co., Big Stone Gap, Va.

Faults, slips, wet conditions, undulating beds of rock and extensive outcrop areas possessing extremely hazardous roof conditions dominate the science of roof bolting in Virginia.

Our first experiments with roof bolts were in the Taggart seam during the early part of 1949. The immediate roof is a fragile drawrock which must be taken down as the coal is loaded or supported with extensive timbering.

As a result of favorable experience, management decided to adopt roof bolting in all of the mines operating in the Taggart bed. Since one of these mines had been developed extensively with timber support, this afforded us an excellent opportunity to compare the performance of the two systems. Roof bolts far surpassed timbers in performance, economy and safety.

In Oklahoma, J. M. Malloy, chief mine inspector, Oklahoma City, Okla.

In Oklahoma, roof control is confined to the use of timbers. We encounter many different kinds of top conditions in the different seams and areas. In most places, posts do a good job at the face although some areas require cross bars or beams.

A coal mine is only as safe as top management, supervisors and the workmen want it to be. There, in my opinion, is the answer to our roof-fall problem. Primary dependence for the safety necessary in reducing roof-fall accidents must be placed upon the at-

INDUSTRY MEETING— A Special COAL AGE Staff-Written Report titude of the people concerned, much more so than on the material used. And that attitude must stem from and be established by top management.

The National Roof Fall Campaign, C. H. Hoch, staff representative, Coal Mining Section, National Safety Council, Chicago, Ill.

The serious frequency and severity rates in coal mining prompted the action which resulted in the national campaign to prevent injuries from falls of roof. The campaign started July 1, 1957 with an enrollment of 1,224 mines. Of the actual total participants, 652 mines have sent in no report. Another 255 mines have sent in only one or the other of the two needed reports.

A total of 307 mines have submitted both reports. Compared to reported experience during base periods, an average reduction of 27% in frequency rate has been achieved during the first six months of the campaign.

If the reporting participants had controlled injuries from falls of roof during the previous 3 yr as effectively as they did during the last six months of 1957, approximately 834 men would not have been injured or killed.

#### Ventilation Problems

Safety Problems with Ventilating Systems Using Multiple Fans, Raymond Mancha, vice president (retired), Joy Mfg. Co., Pittsburgh, Pa.; read by Don Kingery, USBM.

The use of multiple primary mine fans operating on widely separated air-shafts subjects the underground air distribution to an inter-dependency of fan operation. Shutdowns of any one fan can cause air distribution chaos with unpredictable diminutions and increases as well as actual reversal of air currents ventilating working sections of the mine.

To avoid these difficulties the following are suggested:

 Avoid the use of multiple primary mine fans by original planning whenever possible.

2. When necessary to use multiple primary fans, provide duplicate fan and drive units at each fan site to insure continued normal underground air volume distribution following mechanical failure of either the fan or its drive, or during fan or drive maintenance shutdown.

Discussion, C. E. Linkous, director of safety, Island Creek Coal Co., Holden, W. Va.

The merits and disadvantages of ventilating systems employing multiple fans vary, as mines are not alike, and each situation must be studied and decided upon accordingly, with safety being the most important consideration. Sound



FIRES, EXPLOSIONS, TRAINING—B. H. Schull (left), Illinois Department of Mines and Minerals; H. A. Wendel, The Anaconda Co.; M. J. Ankeny, Bureau of Mines; C. H. Sambrook, U. S. Steel Corp.; Arthur Bradbury, session chairman; Dr. Irving Hartmann, Bureau of Mines; Domenic Stanchina, Ohio Division of Mines; and J. H. Phalan, Kentucky Department of Mines and Minerals.



AC POWER, SHAFT SINKING, COAL PROGRESS—Finlay McCallum (left), Colorado Coal Mine Inspection Department; Harry Gandy, National Coal Association; W. C. Campbell, Homestake Mining Co.; J. C. Olzer, Hanna Coal Co.; C. L. Wilson, West Virginia Department of Mines; and G. J. Steinheiser, session chairman.



MIIA OFFICERS—C. A. Purcell (left), editor-in-chief; F. T. Powers, treasurer; Joseph Mulligan, assistant secretary; C. A. McDowell, secretary emeritus; Joseph Bierer, secretary; R. D. Bradford, G. J. Steinheiser, and Arthur Bradbury, vice presidents; and B. H. Schull, president.

engineering can approximate the maximum volume required and resistance to expect during the planning stage. In most instances, case histories of other mines operating in the same coal bed and general area, or core drills contribute valuable information in calculating the resistance and volume. Howver, even though sufficient airways are provided during development, the acquisition of more acreage or the encountering of faults makes it necessary to use multiple fans.

Where multiple fans are used, they should be installed in series or in parallel, or they can be installed to departmentize the area being served by each fan. However, you rarely see fans installed in series as very little is gained by one fan discharging its volume into

the intake of the other.

When the ventilation has been departmentized, problems arise at times in areas where circuits border and the air is neutral. It is highly essential that these neutral areas be checked thoroughly and frequently and action taken to provide positive currents. Otherwise you may get an accumulation of methane in the neutral area.

Discussion, E. E. Quenon, director of safety, Peabody Coal Co., St. Louis, Mo.

It appears to me that some of the safety problems arising from use of multiple fans are chiefly, if not entirely, confined to those in which the airways served by each are connected so that the fans must operate in part through common airways.

Several key solutions to the safety problems come readily to mind. They

are as follows:

1. The forecasting of future requirements can be made with reasonable accuracy by competent personnel through ventilation surveys, if they take the pains to collect accurate and adequate data. With development of computing machines, such as, the electric analogue used by the Ventilation Section, USBM, to solve ventilation problems, it is now possible to double check calculations and even forecast ventilation requirements without working out the entire problem mathematically.

2. Automatic doors should be erected

to prevent reversal of air.

3. When one of a series of interconnected main fans fails, the power should automatically be cut off in the entire mine.

4. Auxiliary, automatic fan drives should be installed for each main fan. 5. Specific instructions should be

posted, outlining procedures in case of a fan failure.

Auxiliary Fans to Improve Face Ventilation in Continuous Mining, George R. Higinbotham, president, Mountaineer Coal Co., Fairmont, W. Va.

The industry is now being confronted with an acute face ventilation problem. The use of line brattices is not dependable and does not always maintain a gas-free atmosphere. These continuous machines, especially the borer type, virtually fill the working area and act as a barrier to the flow of air to and across the face.

Auxiliary fans, previously discounted because of abuse in practice, are now being considerd by the several regulatory agencies in the industry when properly used. It has been recognized that with the continuous miners, fans and tubing offer a definite means to overcome the restriction to passage of air. In view of experiments conducted in recent months, it would seem that the use of auxiliary fans points the way to a method of providing substantially improved face ventilation.

Mine Fires and Explosions

Continuous Gas Detection at Working Faces and Proposed Controls of Face Electrical Equipment, Marling J. Ankeny, director, Bureau of Mines, Washington, D. C.

Until suitable means of face ventilation are developed that will assure continuous removal of methane from face areas, some method must be devised to counteract human frailty. The only sure way of counteracting human failures is to install, as an integral part of each piece of electric face equipment, a continuous, automatic methanemonitoring device that will transmit a message back to the power center. The device must be entirely dependable and designed so that when the methane content reaches a predetermined concentration below the danger point the power will be cut off from each machine. Assuming that a device can be designed, it might be further refined to give a preliminary warning.

Bureau personnel will be available for discussion and consultation, and its laboratory facilities will be available for preliminary testing of any automatic methane-monitoring device to assist a manufacturer in determining whether he

is "on the right track."

Discussion, G. H. Sambrook, director, mine inspection, Coal Div., U. S. Steel

Corp., Pittsburgh, Pa.

The two recent explosions discussed briefly in this paper leave no doubt as to the importance of both adequate face ventilation and knowledge of the condition of the air. Following the first explosion mentioned, we in the coal division of U. S. Steel felt that something more should be done than merely the routine examinations made with the safety lamp. After consultation with officials of the Bureau of Mines and State Department of Mines, we began the practice of suspending a specially

protected lamp in advance of the operator. This lamp has a height line painted on the chimney and is in constant view of the operator. Thus any increase in gas liberation may be detected more quickly than is possible with intermittent testing.

At the same time we began experimenting with other portable detectors manufactured by Mines Safety Appliances Co. and approved by the Bureau of Mines. One of these detectors is hung from a timber in advance of the operator and the other is mounted on the machine. The detector on the post is set so that a red light comes on when the methane exceeds 1%. The other is set so that a red light comes on when the quantity of methane reaches 2%. We found very quickly that a minimum of 5,000 cfm at the end of the line curtain ahead of the operator was needed to keep the working face clear.

Experiments in the Use of the Foam Plug in Fighting Mine Fires, Dr. Irving Hartmann, chief, Branch of Dust Explosions, Bureau of Mines, Pittsburgh,

The experiments performed to date indicate that coal fires of moderate size and intensity can be brought under control by relatively moist foam plugs generated several hundred feet upwind from the fire. One of the most important factors determining the distance over which a continuous foam plug can be transported in mine entries is the air pressure available at the foam-generating net. When the pressure is limited and not quite adequate to drive the plug, two procedures as suggested: (1) Augment the air pressure by temporarily installing an auxiliary blower in the entry; or (2) after generating and transporting a foam plug to the limiting distance, stop foam generation and, if circumstances allow, advance the net and equipment toward the fire, reset it and renew generation.

The practicality of the latter suggestion requires investigation, and many other phases of the problem need further study before the foam-plug method can be recommended for trial in active fires. In any event, the method should be considered only when a fire cannot be approached closely enough for normal fire-fighting operations, or for controlling

rapidly advancing fires.

What Can We Do to Stop Ignitions at the Face?-In Ohio, Domenic Stanchina, chief, Division of Mines, Columbus. Ohio.

Following are some of the methods that are being used or could be used to eliminate the face ignition menace:

1. The foreman and the men at the working face should have training in

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how the working place is ventilated. They should be trained to know how quickly methane can accumulate in dangerous quantities when a door, stopping or line brattice is left open.

2. Eliminate line brattices wherever possible and use an exhaust fan to conduct the required volume of air acress

the face.

3. A volume of 6,000 cfm of air passing through the last open crosscut has become a standard practice, but there is no reason why this should not be increased should the condition require it.

4. We need to concentrate our thinking and use our ingenuity to develop some method whereby the men at the face would know immediately that their source of ventilation was cut off.

In Kentucky, James H. Phalan, chief, Department of Mines and Minerals,

Lexington, Ky.

The primary sources of ignition at the face in Kentucky can, I believe, be listed in regard to frequency as: (1) electric origin, (2) human caused—open lights, smoking, etc., (3) explosives and (4) friction.

To maintain our production, electric energy to power and illuminate mining equipment is necessary. Therefore the only safe step to take is to provide that such equipment be constructed and maintained so that short circuiting, arcing and sparking are eliminated.

The second source, human, can be almost wholly eliminated. The third source, explosives, has been reduced materially in the past few years. The fourth source, friction, has been a major cause of face ignitions, but is now one which we in Kentucky believe is due serious consideration, especially since the increased use of extensible belts is being applied with continuous mining equipment. The source of ignition by friction can be greatly reduced by proper installation and maintenance, frequent inspection, with added protection from overload, centrifugal and thermal-operated switches.

In Illinois, B. H. Schull, director, Department of Mines and Minerals, Springfield, Ill.

As I see it, if adequate ventilation is provided to the working faces at all times and throughout our mines we will not have ignitions. The strict observance by all of the following rules will go a long way toward preventing ignitions:

1. Competent supervision.

The foreman must be familiar with the power circuit in his section so he can take immediate action to disconnect it if necessary.

3. The foreman must arrange for proper and timely examinations of his section by competent personnel with a flame safety lamp.

 The foreman should personally measure the air entering his section at frequent intervals.

The foreman should issue instructions, and see that they are carried out, that before equipment enters a place a thorough examination for gas should be made.

#### Training

Safety Training and Education Program, Butte District Operations, The Anaconda Co., H. A. Wendel, chairman, Bureau of Safety, The Anaconda Co., Butte, Montana.

Training projects must be formulated on the principle of defining safety policies and practices, and providing safety experiences. The objective being to induce and develop safety consciousness so all employees will carry it into every phase of daily living.

All of these factors have been incorporated into the present positive "Accident Elimination" program currently being promoted by Anaconda at its Butte district operations. The basic philosophy is: Proper safety attitude and behavior can be accomplished only through a continuing positive, coordinated, diversified program of training and education.

#### AC Power

AC Power for Underground Mining Equipment, J. L. McQuade, president, Donegan Coal & Coke Co., Richwood, W. Va. and J. C. Olzer, safety director, Ireland mine, Hanna Coal Co., Moundsville, W. Va.

The use of AC equipment for mining has several distinct advantages: (1) The system is inherently safer, (2) it is more economical and (3) it is more reliable. A cable tester is a necessity for operation of an AC mine. With ground-tripping circuits and phase-to-phase overload protection, cable failures are almost impossible to find since there is rarely a sign of an arc or even the odor of burned insulation.

#### Shaft Sinking

Metal Mining, W. C. Campbell, assistant mine superintendent, Homestake Mining Co., Lead, S. Dakota.

Safety has been the major consideration in all the shaft-sinking jobs. The use of safety screens, trap doors at the collar, safety devices on the hoist and cage, safe blasting practices and adequate ventilation all contribute to safety and efficiency on the job. Regular inspection of ropes and other equipment is an important part of the job.

Coal Mining, F. R. Zachar, mining engineer, Morgantown, W. Va., read by C. L. Wilson, chief, Department of Mines, Charleston, W. Va.

The size and depth of the shaft us-

ually determine the method of sinking. Briefly, three present day methods are: (1) conventional, (2) pre-drilling, a relatively new technique for sinking relatively shallow shafts up to 200 ft deep but which gives promise of being applicable to deeper shafts, and (3) drilling large-diameter holes (up to 75 in) which is being used more and more often.

#### Mining Progress

Participation of State Mining Departments in Coal Industry Progress, G. C. Trevorrow, safety director, Bituminous Coal Operator's Association, Washington, D. C., read by Harry Gandy, safety director, National Coal Association, Washington, D. C.

It is the responsibility of the regulatory bodies of the states to see that their laws are adequate to protect employees and properties from new techniques which might be harmful. To meet changing conditions, eight of the coal-producing states within the past 9 yr have seen fit to make major revisions in their laws regulating coal mines. This revision required the cooperation of representatives of the regulatory bodies, coal operators and the UMWA. In addition to striving for the best possible regulations from the standpoint of safety and efficiency, the groups have tried to gain uniformity with the provisions of the Federal Coal Mine Safety Act and the Federal Mine Safety Code. They also have attempted to get uniformity in these various state mining laws.

In West Virginia, C. L. Wilson, chief, Department of Mines, Charleston, W. Va.

The enactment of our progressive Coal Mine Safety Law passed February 4, 1958 and effective July 1, 1958, is an epitome of bipartisan politics and discloses how vitally interested both parties are in the incumbency of the mine inspector's duties. Credit is also due our workers and operators who were quick to respond to the need for the enactment of our new law. There were 33 major changes or additions to the law.

In Colorado, Finlay McCallum, district inspector, State Coal Mine Inspection Department, Denver, Colo.

The trend of increased safety is due to our excellent safety standards, practical rules, thorough inspection service, effective protective devices, and employers and employees who believe and practice safety in and around the coal mines.

Management has a large stake in safety and can contribute by: (1) planning and arranging operations with careful attention to safety, (2) providing a safe plant, equipment and tools, (3) maintain safety-minded supervision, and (4) making full and prompt report of all injuries.

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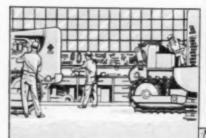


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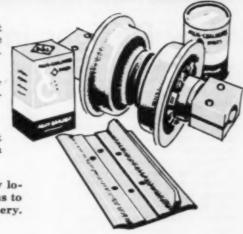
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CONVEYORS—C. C. Conway (left), assistant general manager, National Mine Service Co., Indiana, Pa.; H. A. Jones, general superintendent, Carbon Fuel Co., Carbon, W. Va.; Fred R. Toothman, engineer, C & O Railway Co., Huntington, W. Va.; J. C. Cosgrove, district manager, Goodman Mfg. Co., Huntington, W. Va.

New developments and improvements in mining equipment, changes in West Virginia mining laws, haulage and preparation viewed at Huntington session.

Major theme of West Virginia Coal Mining Institute meeting:

### New Designs in Mining Equipment

THE WEST VIRGINIA Coal Mining Institute marked its 51st year of operation at its annual spring meeting held in Huntington, W. Va., June 27-28. Organized in 1907, the Insitute's main objectives are to promote safety, technical advancement and education for the coal mining industry of West Virginia.

Operational problems and techniques of the coal mining industry were discussed at the 2-day meeting. William J. Skewes, chief engineer, Pocahontas Fuel Co., Pocahontas, Va., presided at the Friday luncheon, R. M. Hoisington, city manager, Huntington, W. Va., was guest speaker. George McCaa, general manager, Ireland mine, Hanna Coal Co., Moundsville, W. Va., was toastmaster at the dinner. Guest speaker was Robert R. Tincher, vice president, Crowles Broadcasting Co., WHTN-TV, Huntington, W. Va.

Following are abstracts of the technical papers.

Evolution of Rope Belt Conveyor, by J. W. Hardy, products manager, Goodman Mfg. Co., Chicago. (Read by J. C. Cosgrove, district manager for Goodman at Huntington.)

Design and construction of the Ropebelt conveyor by the Goodman Mfg. Co., enabled its first customer to make the 160-ft belt extension by a face crew of 6 men in 1 hr with one shuttle car of material. This was in contrast to the requirements of advancing a rigid frame conveyor which required 6 men, 6 hr with 6 shuttle-car loads of material.

The first Ropebelt was equipped with carrying idlers mounted and cradled in rigid support frames. Later these cradles were eliminated and the idlers were hinged at the shaft ends, which provided more spring action and load conformity and also increased the carrying capacity of the belt by as much as 20%. The tension-controlled rope action permits the belt to trough at least 35 deg when loaded and to return to the normal 15 to 20 deg when the belt is empty.

Goodman engineers have installed an 800-ft closed circuit Ropebelt system which includes a 100-ft clear span for bridging gulleys and roadways. This is part of Goodman's program to analyze and experiment with new developments using the Ropebelt conveyor.

INDUSTRY MEETING— A Special COAL AGE Staff-Written Report Rope-Driven Conveyors, by C. C. Conway, assistant general manager, National Mine Service Co., Indiana, Pa.

The rope-driven conveyor is in no way similar to the rope supported conveyors. It is a conveyor built specifically for high lifts, long centers and high capacity. It differs from other conveyors in that it utilizes the tensile capabilities of steel ropes to accommodate all tension requirements so that a single-ply belt construction is used for every application, regardless of the center distance and lift requirements.

Basically, the Cable Belt rope-driven conveyor has two endless steel ropes each extending the full length of the drive. Ropes are placed on each side of the belt and separated a fixed distance, depending on the width of the belt. These ropes carry the belt on both the carrying and return run. The belt at every point, except while on the head and tail pulleys, is in contact with the ropes. This continuous frictional contact requires no gripping action and is not required to transmit any tensional stress necessary to move or lift the load.

The Cable Belt rope-driven conveyor is comparatively new and the first installation was made in 1951. The only installation on this continent is at the Princess Colliery in Nova Scotia but 58 other installations in France, Japan, Australia, South Africa, England and various other locations have been very successful. The conveyors are manufactured by Cable Belt Ltd., Inverness, Scotland.

Precision Belt Roller for Underground Application, by B. L. Waldruff, apparatus sales, mining div., Jeffrey Mfg. Co., Columbus, Ohio.

The new Permaseal roller will replace the old Reliance and Hercules idlers. Operating tests were made on the idlers to determine how long they would run in dry sand and wet sand before foreign materials would pass through the seal and enter the lubricant next to the bearing. The results compared to other types of seals, such as, labyrinth, felt, labyrinth and diaphragm, labyrinth-felt and feltcomposition are: Permaseal idlers ran 37,046 hr in dry sand while others ran from 11/2 to 950 hr; in wet sand Permaseal ran for 25,145 hr and others for 1/4 to 1/4 hr; and in airborne dust Permaseal ran for 71,479 hr while others ran less than 330 hr. This outstanding performance is achieved by holding all critical contacts to 25 micro-in or less-

The Permaseal roll is designed to eliminate the major problem on idlers, which is frequent greasing periods. After better than four years of service, this seal does not show sufficient wear for us to predict its life.

The New West Virginia Mining Law, by Crawford Wilson, director, West Virginia Dept. of Mines, Charleston, W. Va.

The coal industry has made great strides in safety research in the past half century but we have a long way to go before we reach our goal—preventing all deaths and injuries from mancreated hazards.

The modernized state mining laws, effective July 1, 1958, will aid the mining industry. The following major changes are included in the new law: (1) changing the title of the Chief to Director, West Virginia Department of Mines, (2) conduct research work, (3) provide sufficient number of mine inspectors and changes in districts, (4) make career men out of inspectors, (5) test boring, (6) fire-boss reports, (7) recognize and legalize roof-bolting support, (8) permit use of diesel engines underground and (9) eliminate use of power transformers containing flammable oil underground.

We must move back into the laboratories and created experimentally the conditions we expect to meet in underground practices. If we do our job well, we can predict and minimize the hazards.

New Developments and Improvements



OPERATIONS-W. N. Poundstone (left), superintendent, Humphrey mine, Christopher Coal Co., Osage, W. Va.; Mack Shumate, assistant general manager, Truax-Traer Coal Co., Kayford, W. Va.; I. C. Spotte, assistant to president, Princess Elkhorn Coal Co., Huntington, W. Va.; F. R. Zachar, consultant, Morgantown, W. Va.

in Mining Equipment, by R. T. Hair, sales manager, coal machinery div., Joy Mfg. Co.

Among the latest Joy developments are: Microdyne dust collectors; continuous miners including the 32-in 5-JCM with a new gathering head for cleanup work; transfer conveyor used with continuous miners with space provided for mounting a Microdyne dust collector; belt-turn unit that turns both strands of belt 90 deg: 15-BU conventional loader with a 15-tpm capacity; 15-SC shuttle car with a 15-ton capacity; CD-43 hydraulic drill operated by one man; continuous cutting machine equipped with a 75-hp motor; 16-SC shuttle car with a 170-cu ft capacity; and an 18-SC shuttle car that bends up or down in the middle to 15 deg and is equipped with six wheels, four of which are used for steering and two for traction.

Principles of Preparation Plant Design, by Frank R. Zachar, consulting mining engineer, Morgantown, W. Va.

Consideration of details is important in arriving at a satisfactory design of a preparation plant. It has long been almost standard practice to begin making plant changes almost before the first ton of coal has been processed. This is costly and unnecessary, and such revisions can be eliminated or greatly reduced if proper attention is paid to design details.

Good preparation design demands attention to the following: Preparation goals, provisions for changes, refuse disposal, plant water, loading facilities, rawcoal storage, washing limits, structural details, equipment details, interchangeability, power supply and plant painting. While these subjects cover the major preparation design features, there are others that must be considered.

Full treatment of this subject by Mr. Zachar appears as a 4-page article in the March 1958, issue of Coal Age.

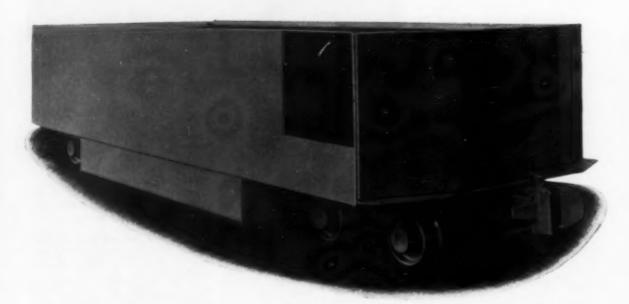
Combination Belt and Mine Car Haulage, by Mack H. Shumate, assistant general manager, Truax-Traer Coal Co., Kayford, W. Va.

At one of the Truax-Traer mines in West Virginia, the use of conveyor belts with mine cars has resulted in a large reduction of mine haulage costs. In 1952, haulage costs were 31c per ton for labor and supplies. Since the installation of conveyor belts, there has been a steady decrease to 20c per ton early in 1958. This is a saving of one third in haulage in spite of five wage increases amounting to \$5.90 per 8-hr day, and additional 10c per ton for the mine workers welfare fund.

Combination belt and mine car haulage facilitiates the extension of haulage during rapid development and extraction behind high-capacity equipment. Belts also permit the mining of a considerable area, the tonnage of which is dumped at a single point. Fewer loading points and 'side tracks and a more uniform loading of mine cars give the coal operator fullest efficiency from his equipment.

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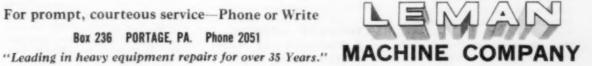
Leman not only restores old equipment to original condition. . . but frequently makes design improvements. As shown here . Leman was first to drill square holes for mounting bits directly into cutter bars . . . fewer parts required . . . repair time and costs reduced.

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SAFETY, DEVELOPMENT, PERSONNEL—R. R. Williams (left), session chairman; Harold Durrett, Hanna Coal Co.; J. D. Reilly, Hanna Coal Co.; F. S. Leonard, C.F.&I. Corp.; and Thomas Allen, Colorado Coal Mine Inspection Department.



MANUFACTURERS-D. M. Stromquist, U. S. Steel Corp.; R. M. von Storch, and K. J. MacLeod, Socony Mobil Co.

Rocky Mountain Coal Mining Institute Discusses . . .

### Personnel Selection, Safety, Methods

RESEARCH, safety, mine development, selecting and training maintenance personnel, operation of AC mines and new products for more efficient mining were major themes at the 54th regular meeting of the Rocky Mountain Coal Mining Institute, Glenwood Springs, Colo., June 29-July 2. Following are abstracts of all papers.

#### USBM Research

Coal and Safety Research Programs of the Bureau of Mines, by Marling J. Ankeny, director, U. S. Bureau of Mines, Washington, D. C.

For almost 50 yr the Bureau of Mines has been engaged in coal research. Today the coal-research program includes studies on the origin and constitution of coal and methods of analysis; the mining of coal, including health and safety aspects; coal preparation, transportation, storage and combustion; coal carbonization and drying; gasification and hydrogenation of coal and many related investigations.

In the West, the Bureau conducts coal-research at Scattle, Wash.; Denver, Colo.; and Grand Forks, N. Dak. Work at Seattle has been underway more than 40 yr and places particular emphasis on coal-preparation problems.

The Denver coal research laboratory originated when a field station was established at Golden, Colo., in 1937 to determine the physical and chemical properties and the low-temperature carbonization yield of coal from the Rocky Mountain area. At the same time a pilot plant was erected at the University of

North Dakota at Grand Forks and became the forerunner of the present lignite research laboratory. At the Denver station the fluidized process of drying and carbonizing low-rank coals was developed.

Many coal studies are being conducted elsewhere that may have a profound effect on the coal industry of the West. These include work on synthetic fuels, the use of nuclear energy to gasify coal and developing hydraulic means to mine coal underground.

#### Mine Safety

Photos Show the Facts, by F. S. Leonard, chief coal mine inspector, The Colorado Fuel & Iron Corp., Pueblo, Colo.

Complete understanding between management and employees has been our goal for a long time, especially in matters of safety. Communication with the employee has taken many forms in the past, all of which contributed to a desire to work more safely.

Our mining department for many years has published a monthly safety bulletin which contains the records of frequency and severity rates, man-hours worked, number of surface and underground accidents and other statistics on our safety program. The main feature of the bulletin is that each lost-time accident for the month is described in

INDUSTRY MEETING— A Special COAL AGE Staff-Written Report detail and recommendations for the prevention of a similar accident are included. For a long time these descriptions were supplemented by sketches in attempting to show how the accident happened and conditions of the area where they occurred. These sketches were not entirely satisfactory.

Later we attempted some perspective drawings. These were an improvement but still left much to be desired. Early last year we decided to try a new tack, that is, to take photographs of the scenes and conditions of the accidents right after they occur and include the pictures in the accident bulletin. We try to obtain the best possible angle in taking the pictures so that, on viewing them, the individuals can practically analyze the accident for themselves.

Safety in Colorado Coal Mines, by Thomas Allen, chief, Colorado Coal Mine Inspection Department, Denver, Colo.

Coal mining started in Colorado in 1880 and since that time safety has been a major item in the industry. The State Department of Mines was organized in 1883 and in 1913 mining laws were enacted. These laws were revised in 1951 to meet present conditions and methods.

Some of the companies have moved ahead of the law requirements and have gone all out for safety. Education and training of personnel started around 1934 and has continued since then. The education program was effective and there was a reduction in accidents.



RESEARCH-R. M. von Storch (left), institute president; Marling Ankeny, director, USBM; and R. R. Williams, The Colorado Fuel & Iron Corp.



COAL TRADE, PURCHASING, IDLERS, AC MINES-E. G. Fox (left), chairman; M. E. Wade, Kaiser Steel Corp.; C. G. Schilbe, Jeffrey Mfg.; C. M. Smith, World Mining Consultants; and W. C. Painter, Joy Mfg.

In Colorado there has been a continual decrease in the number of accidents. Several years ago the state had cut the number of fatal accidents down to two to four a year. The latest record is 20 continuous months without a fatality. This record will continue so long as we have cooperation between labor, management and government agencies.

#### Mine Development

Development of the Ireland Mine, by James D. Reilly, vice president, Hanna Coal Co., Cadiz, Ohio.

The rapid expansion of the aluminum industry has created a large demand for electrical energy. In the past, many of these plants were located near water power but remaining sources of water power are not great enough to supply the needs of the new aluminum plants. As a result, the aluminum companies are turning to coal as a source of energy.

To amortize the cost of a power plant needed for the aluminum plant a block of low-cost coal was needed. Such a reserve, containing 100 million tons of coal was available in northern West Virginia at the site of the present Ireland mine.

The coal can be mined economically because of recent developments in continuous miners and roof bolting. Roof bolters are mounted on the continuous miners and additional support only 7 ft from the face is provided by a wooden crossbar supported by hydraulic jacks mounted on the machine. A recent development in bolting makes it possible to bolt within 3 ft of the face. Productivity from the continuous miners is excellent.

The haulage system includes panel rope belts and 20-ton cars for mainline transportation. Large mine cars were chosen for main haulage because the company expects to go back 20 mi from the river before the mine is exhausted.

The preparation plant is simple in design and all units are installed in duplicate so that maximum flexibility will be possible. Clean coal will be transported to the nearby char plant where 15% of the coal will be removed as tars which will serve as a raw material for manufacture of a wide variety of chemicals. The goal is to get the most from the coal product, from the time it leaves the preparation plant to the end products.

#### Selecting and Training Personnel

Selection and Training of Maintenance Personnel, by Harold L. Durrett, personnel manager, Ireland mine, Hanna Coal Co., Moundsville, W. Va.

The increasing quantity and complexity of our machinery, which adds so much to our productivity, also makes increasingly greater demands upon our human resources. The proper selection, placement and training of efficient operators and maintenance personnel has become one of the most important determinants of whether we operate profitably.

We are all keenly aware of the current cost of a physical plant and equipment, but are we aware that for every dollar spent on plant and equipment, at least two dollars will be required for human ability to construct, operate and maintain it?

The more commonly used selective devices of assessing a prospective employee's potential are: application forms, interview, psychological tests and references. To summarize our progress and trends in selection of maintenance personnel, I can conclude only that some small steps have been taken in the right direction.

Training, like all good personnel work

which must accompany it, cannot be justified except by empirical proof that it is paying its way. Results of training should be validated against performance. Continuous revision and improvement are imperative to prevent stagnation.

#### Coal Trade

World Trade in Coal, by Cloyd M. Smith, vice president, World Mining Consultants, Inc., Washington, D. C.

There are two aspects of our foreign trade in coal: export and import. The volume of coal exported ranged from 9 million tons per year during the depth of the depression to 76 million in 1957. Approximately 3 to 5% of our output was exported until the years after World War II. It now is about 16% of our production. Imports have been only slightly more than 250,000 tons and is principally Nova Scotia coal destined for New England.

Export trade is seasonal, being highest in summer and lowest in winter. Great Britain and Germany are becoming active in the export business and the United States will be facing more competition from them. In general we have the picture of tough competition in the next few years.

#### Purchasing

What is Required to Realize Profits Through Purchasing, by M. E. Wade, assistant purchasing agent, Kaiser Steel Corp., Fontana, Calif.

One of the major factors almost constantly under discussion is the amount of purchasing dollars in the total cost of the product produced. We can safely say that 50c of each dollar of product is made up of purchased material in that product. Some will question this in regard to coal.

Commodities whose costs fluctuate can be purchased when the market is down,

## Why settle for <u>less</u>, when one of Caterpillar's modern heavy-duty Diesels will fit your needs?

Here's what some owners and users, who wouldn't settle for anything but CAT power, think of their diesels:

"As good an engine as I have ever seen!"

-Tim Fleming, co-owner, Fleming Coal Co., Wise, Va.

"These Cat Engines are economical to operate and don't break down!"

-G. W. Moore, owner of the Moore Coal Co., Wise, Va.

"Our Cat Engines are easy to maintain and have a long life span!"

 —A. J. Schmidt, purchasing agent, the William Aloe Coal Co., Imperial, Pa.

"We get good all-around service from our Cat equipment, and from our Caterpillar Dealer."

> -Roy Coulson, division superintendent, Vitro Minerals Corp., Riverton, Wyoming.

This is typical of owner-user reaction to Cat Diesels. Hundreds of power unit combinations are available to match your specific loads. Cat Diesels are compact, and have a record of highly satisfactory use in all diesel applications throughout the world. And the dealer parts and service that stand behind them insure a minimum of down time.

Each diesel reflects the very latest Caterpillar research, to up production and lower operating costs. Bulk has been eliminated, and extra power and longer life have been added through superior design and metallurgy. The fuel system of Cat Engines requires no adjustment. There are no cylinder ports to clean and Cat four-cycle design provides a smooth, efficient utilization of power. These and other features add up to new performance standards in diesel power.

So, for original power or repowering, it will pay you to specify Cat Diesels, available in over 150 other manufacturers' machines. And your nearby Caterpillar Dealer can solve your power problems and give you greater profits.

Engine Division, Caterpillar Tractor Co., Peoria, Ill., U. S. A. Caterpillar and Cat are Regulated Tradamarks of Caterpillar Trastar Co.

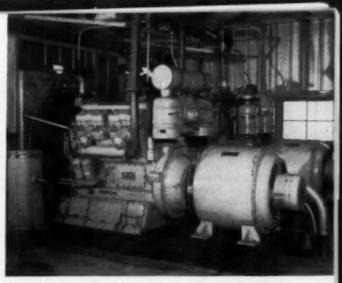
A Cat D397 Diesel furnishes power for this Lima shavel, and a D375 powers another shovel loading out slag from stock-

pile in Steelton, Pa., for C. J. Langenfelder & Son, Inc. Cat Engines are compact, and stand up in the rough shovel work.





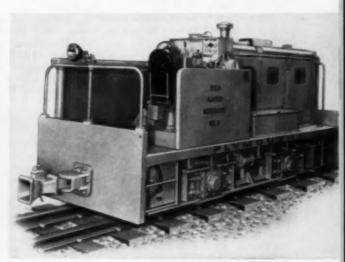
Portable power can move with your job. Here a Cat D397 Mobile Electric Set supplies power for a shaft-sinking operation in uranium fields near Grants, New Mexico. Cat Mobile Electric Sets are dependable, easy to start, and easy to service.



When mining operations begin many companies rely on Cat Diesels. These D375s supply over 450 KW to power hoist, lights, ventilation and battery-charging equipment for underground uranium mine, where "second best" power won't do.



A Cat D318 Diesel Engine powers this Bucyrus-Erie shovel stripping overburden from clay deposits for cement manufacture. Owner of rig is Elmer Gower, Kunkletown, Pennsylvania. Cat engines provide dependable power for excavators.



One of a number of Cat Diesel powered Plymouth locomotives now serving underground on the Trinity River Project near Whiskeytown, California. Owned by Shea Kaiser Morrison, a Cat D326 (Series F) powers this model JL 15-ton unit.

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thus realizing a saving. Purchasing for a coal mine is not unlike purchasing for any other operation. Factors to be considered in purchasing include the longth of service, quality of the product and dependability of the manufacturer. All things being equal, price decides which product will be bought.

Many factors other than price must be considered when buying mine supplies. The purchaser must be well acquainted with the use of a product if he is to select the right product.

#### New Belt Idler

Results of a Study in Belt Idler Design—The Perma-Seal Idler, by C. G. Schilbe, district manager, Jeffrey Mfg. Co., Columbus, Ohio.

It was realized that idlers failed to meet the standards for high-speed, heavy-duty service. As a result, Jeffrey Mfg. Co. developed the Perma-Seal unit to replace present idlers.

Test results show continuous operation before dust passed through the seal as follows:

In dry sand-37,046 hr In wet sand-25,145 hr In airborne dust-71,479 hr

The Perma-Sal idler has dust and grease seals and Timken bearings similar to those in an automobile. Bearings are known to wear out from excessive lubrication and dirt, and the new unit is designed to correct this. A vent hole in the end bell permits air to enter the idler so that there is no pressure buildup and there is breathing of the seal.

The unit is designed to climinate frequent greasing. After 5 yr of service, test units show little wear. It is recommended that idlers be inspected periodically for adequate grease, condition of the bearing, presence of dust and condition of the seal. This should be done to determine when to relubricate.

The new Perma-Seal unit has been undergoing tests since 1953 and the only replacements have been the result of roof falls on the conveyor line which damaged the idlers.

#### AC Mining Equipment

Operation of AC Mines, by W. C. Painter, service engineer, Joy Mfg. Co., Price, Utah.

In 30 yr experience in western mines as master mechanic, chief electrician and field service representative for Joy Mfg. Co., I have seen a steady rise in the acceptance of AC-powered equipment for coal mines. For the same power requirements, the electrical systems of DC and AC mines are practically identical from the incoming source to the underground substations where the power is either conveted to suitable DC or the voltage reduced to the value required for the AC face equipment.

A favorite piece of DC conversion

#### Rocky Mountain Officers

President-R. R. Williams Jr., manager of mines, The Colorado Fuel & Iron Corp., Pueblo, Colo.

Vice Presidents - Colorado - G. E. Brennan, Imperial Coal Co.; Montana - W. J. Johnson, Roundup Mining Co.; New Mexico-C. E. Presnell, International Minerals & Chemical Corp.; Wyoming-Louis Jasper, Union Pacific Coal Co.; Utah-N. W. Anderson, Books Cliffs Coal Co.

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Executive Board-Colorado-A. E. Pagnotta, The Colorado Fuel & Iron Corp.; New Mexico-Clyde Osborn, Homestakes Partner, Inc.; Utah-W. W. Clyde, Knight Ideal Coal Co.; Wyoming -Mike Zakotnik, Kemmerer Coal Co.

equipment is the 300-kw rectifier that currently sells for about \$40,000. The corresponding equipment for an AC mine is a 300-kva transformer that sells for around \$9,000.

In practice, the portable rectifier is often installed in an expensive, permanent-type room. No special rooms are provided for the AC power centers. They are usually skid-mounted and installed as close to the operating area as possible.

Wilmer Wright, superintendent of maintenance at the Sunnyside, Utah, mines of Kaiser Steel Corp., states that the electrical maintenance on one DC continuous miner was equal to that of 10 AC miners. Mr. A. E. Pagnotta, general mine foreman, Allen mine, Colorado Fuel & Iron Corp., Trinidad, Colo., states that in his mining experience the ratio of DC to AC motor burn-outs is 10 to 1. In his opinion, an AC mine is 150% better than a DC mine. Mr. Tony Fratto, general master mechanic, Independent Coal & Coke Co., has an AC mine at Castle Gate, Utah and a DC mine at Kenilworth under his supervision. Mr. Fratto says that he has not had a motor burn-out on any of his AC equipment, some of which has been in service for 17 yr. He has lost an average of one DC loader armature each year and one cutter armature every 2 yr.

Because they believe AC mining equipment will give them greater dependability and lower mining costs, a number of western companies are presently converting to 100% AC operation. Mid-Continent Coal & Coke Co.'s Dutch Creek mine at Redstone, Colo. was opened as a DC operation. They are now making arrangements to dispose of all of their DC equipment and replace it with AC equipment. Carbon Fuel Co., Helper, Utah, is a striking example of a company reaching very high efficiency by successive steps in modernization and

climaxed by becoming a 100% AC operation. The company reports that AC motors and controls give only one-tenth the trouble of DC and that AC is so superior to DC for mining that there is absolutely no comparison in regard to efficiency, maintenance and over-all operating costs.

Kaiser Steel Corp.'s Koehler mine is being completely modernized. The 500-V DC mainline haulage equipment will be retained but all other DC equipment will be removed and replaced with AC.

Mr. Lloyd Ingles, superintendent of Colorado Fuel & Iron Corp.'s Allen mine is a strong advocate of AC mining. While superintendent of Kebler mine, he was instrumental in changing it from DC to AC. The AC installation was so successful that the company decided that Allen mine and all future mines of the corporation would be furnished with AC equipment.

#### Ammonium-Nitrate Blasting

Ammonium Nitrate and Its Use as a Blasting Agent, by D. M. Stromquist, technical representative, Coal Chemical Sales Div., United States Steel Corp., Salt Lake City, Utah.

Most of the ammonium nitrate used today for blasting is made by combining nitric acid and anhydrous ammonia to form a solution of ammonium nitrate. This solution is concentrated by evaporation to the point where it will solidify immediately when cooled to form nearround pellets or so-called "prills." The prills are dried, cooled and coated, generally with diatomaceous earth which aids in preventing caking due to absorption of moisture.

Most users begin by using the same powder factor for ammonium nitrate as conventional explosives and identical drill patterns as before. Hydrocarbons used as sensitizers vary greatly all the way from diesel fuel to crankcase drainings. But it is safe to say that diesel fuel or fuel oil are preponderantly used and in the weight ratio of 94% ammonium nitrate to 6% hydrocarbon. The majority of the operators bottom prime with dynamite or other selected high explosives, although other priming locations in the hole frequently are used. Electric blasting caps and Primacord are both widely used for primer detonation.

After the first saving was realized, operators started searching for ways of cutting handling costs and obtaining increased efficiency from the material as well as loading boreholes safely and quickly. This has resulted in the construction of bulk loaders and air-loading devices.

#### Lubricants

New Greases, by K. J. MacLeod, Socony Mobil Oil Co., Denver, Colo. (Continued on p 134)

# NEW...FROM JOY LOW SEAM SHUTTLE CAR HAULS 4½ TONS

You can cut low seam haulage costs in half and speed up your entire operation with this completely new shuttle car. The reason for the 18-SC's greater capacity is its unique six-wheeled design. Joy engineers added another wheel to each side of the car, reduced the size of all wheel units, and hinged the car in the middle. The result is an extra-large conveyor, 6 feet wide and 27 feet long that empties 4½ tons in 27 seconds.

DRIVE WHEELS IN MIDDLE OF CAR—The two center wheels are used for the traction drive. Each wheel is driven independently by a 10 HP motor through a reducer and chain and sprocket, thus eliminating transmissions, torque converters and differentials.

FOUR WHEEL STEERING—The two wheels at both ends of the car are steered hydraulically by twin boosters on each side of the car, and are controlled from the centrally located operator's station. The 18-SC has an inside turning radius of 11 feet. ELIMINATION OF EXPENSIVE WHEEL UNITS—Since each of the six wheels is used *only* for steering or *only* for traction, the wheel units are extremely simple . . . easy and inexpensive to maintain.

State

UNIQUE SUSPENSION . . . NO AXLES . . . WHEELS HUG ROUGH BOTTOM—The four wheels used for steering are individually pivot-mounted to permit two wheels at one end to assume different elevations while the car bed remains level. This suspension, combined with the articulated mid-section, makes the 18-SC completely flexible throughout its length and width. Also, maximum ground clearance, since there is no axle running under the car.

Other models are available for work in higher seams. Talk to a Joy engineer. Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.



BENDS UP-AND-DOWN IN THE MIDDLE—For maximum flexibility under all conditions, the 18-SC is hinged across the width of the car, near the traction wheels. When climbing up and down small rises and depressions the car actually bends in the middle, keeping the wheels in contact with the ground at all times. This hinged design also permits running the discharge end of the car up a ramp when an elevated discharge is desired.



WBW CL 7202-246A

#### JOY ... EQUIPMENT FOR MINING









All Joy coal mining equipment, including the new 18-SC, is available with AC or DC.

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COAL IN NOVA SCOTIA—Sydney C. Mifflen (left), secretary-treasurer, Mining Society of Nova Scotia; M. G. Goudge, new first vice president and session speaker; D. Owen Hartigan, retiring president; E. Sterling MacLean, new president; Hon. E. A. Manson, Nova Scotia Minister of Mines; Louis F. Frost, new second vice president; and David G. Burchell, president, Canadian Institute of Mining & Metallurgy.



HOIST ELECTRIFICATION, EXPLOSIVES – J. A. Russell (left), Dominion Coal; R. G. Phari, Canadian Industries, Ltd.;
 W. S. Wilson, Dosco, chairman; J. J. Laffin, Dominion Coal; and G. L. Tiley, Canadian Westinghouse Co., Ltd.



SAFETY AWARD-D. G. Burchell, CIMM (third from left), presents the John T. Ryan trophy to John Fraser, Arch Mac-Donald and Douglas Dunlap, representing Princess Mine, Old Sydney Collieries, Ltd.



POWER AND SAFETY—Harry F. Weaver (left), United States Bureau of Mines, and A. R. Harrington, representing Nova Scotia Light & Power Co., Ltd.



RIPPLE ROCK, RUSSIA-E. J. Surett (left), and D. G. Wallace, du Pont of Canada; D. Owen Hartigan, Indian Cove Coal Co., presiding; E. F. Newman, USBM.

August 1958 . COAL AGE

## Mining Society of Nova Scotia

RANGING from Nova Scotia to Russia and covering coal mining, utilization, safety and related mining subjects, the 71st annual meeting of the Mining Society of Nova Scotia convened at Keltic Lodge, Ingonish Beach, N. S., July 3, and adjourned July 5. Society business included induction of new officers, announcement of awards and presentation of the regional safety trophy.

Officers for the 1958-59 term inducted

at the meeting were:

President-E. Sterling MacLean, mechanical superintendent, Dominion Coal Co., Ltd. Mr. MacLean succeeded D. Owen Hartigan, president, Indian Cove Coal Co., Ltd.

First Vice President -M. G. Goudge, chief mining engineer, Nova Scotia Dept.

Second Vice President-Louis Frost, chief mining engineer, Dominion Coal & Steel operations.

Secretary-Treasurer-Sydney C. Mifflen, technical assistant to the vice president and general manager, Dominion Coal & Steel operations.

Society counsellors are: E. D. Brown, National Gypsum (Canada), Ltd.; David G. Burchell, Bras d'Or Coal Co., Ltd.; J. C. Eaton, Magnet Cove Barium Corp., Ltd.; H. C. M. Gordon, Frank Doxey, R. P. Nicholson and W. S. Wilson, Dominion Coal & Steel operations; Frank S. Jones, Canadian Industries, Ltd.; S. G. Naish, Joy Mfg. Co.; and J. J. Laffin, Angus MacDonald, D. F. McFadgeon, R. F. MacKinnon, E. B. Paul, J. A. Russell and J. E. Terry, Dominion Coal Co., Ltd.

Five awards for honors in examinations and in academic courses were presented by Mr. Gordon, vice president and general manager, Dosco coal operations, at the Thursday luncheon session. Those honored were: Lybison H. Mac-Kay, Evans Coal Co., examination for colliery managers; Hugh A. MacDonald, Dominion Coal Co., Ltd., colliery underground managers; James H. Burden, Dominion Coal Co., Ltd.; examination for overmen; Wolfgang Halderle, geology, St. Xavier University; Wayland S. Read, geology, Acadia University.

The regional John T. Ryan trophy for the best safety record in 1957 went to Princess mine, Old Sydney Collieries Co., Ltd. It was presented by Mr. Burchell, director and general manager, Bras d'Or Coal Co., Ltd., in his capacity as president of the Canadian Institute of Mining & Metallurgy. The award, given at the Friday luncheon session, was accepted for the mine officials and men by Arch MacDonald, manager; Douglas Dunlap, underground manager; and John Fraser, night underground manager. Princess mine also received the award in 1949 and again in 1950.

#### Coal in Nova Scotia

The technical sessions were opened by the Hon. E. A. Manson, Nova Scotia Minister of Mines and Minister of Trade & Industry, who referred briefly to the trying times now being experienced by the coal industry of Nova Scotia. In spite of these trials, he expressed the opinion that the industry was basically in the best shape in its history.

Problems and progress in coal mining in Nova Scotia were treated in more detail in the presidential address by Mr. Hartigan. All concerned, he noted, have pressed for higher efficiency, but the gains in these directions have been largely wiped out by losses of markets to other fuels, high transportation costs, high material and supply costs, and inability to break into the export market. One need is better preparation to compete with imported coals,

The present recession is another factor in the Nova Scotia situation. Many studies have been undertaken to develop remedies for both the basic and recessional difficulties. There is general agreement that national and industry needs require a basic production level of 7 to 71/2 million tons, and also on the fact that demand will accelerate after 1965 and should be 50% higher

Meantime, it is necessary to maintain the 7- to 71/2-million level, which means that government assistance is necessary until demand permits the industry to go on its own. Such assistance is consistent with general governmental policy. And on top of governmental assistance, the cooperation of the public and labor is essential.

Reviewing Nova Scotia mining, including coal, Mr. Goudge pointed out that though the industry is going through a troubled period, the mines have been kept in full-scale operation and the men employed. Output in 1957 was 5,686,-000, or 1.3% off from 1956. A good omen for the future is the rising trend in output per man, which reached 2.61 tons per shift in 1957, compared to 2.31 in 1955 and 2.33 in 1936.

#### Hoist Electrification

Electrification of three large hoists at Nos. 12 and 20 collieries of the Dominion Coal Co., Ltd., was the opening topic at the second technical session, with Mr. Wilson presiding. This electrification was authorized in 1956, said Mr. Russell, chief mechanical engineer for Dosco, as a result of the increasing utility efficiency, and was the final step in a program taking in all steam-driven equipment. One of the hoists was a skip installation, the second was for men and material, and the third was a slope unit for coal. Study of the problem showed that identical 1,800-hp hoists would serve and would simplify maintenance and stocking of repair parts.

All new electrical and mechanical equipment, including special flexible couplings for attachment to one end of each drum shaft, were obtained and, as far as possible, put in place while the old hoists continued to operate. The actual changeover was started at 11 pm July 26, 1957, and completed before 7 am August 12-the vacation period for the miners.

Factors influencing the selection of the electrical equipment were detailed by Gerald L. Tiley, Canadian Westinghouse Co., Ltd. Getting identical-sized motors involved, among other things, solving the problem of heat dissipation on the No. 20 coal hoist. A 71/2-hp blower reduced what would have been a rating of over 2,400 hp to slightly over 1,800. A blower also was installed on the man-and-material hoist for reduced-speed operation with heavy loads. No blower was necessary on the slope

How the electrical equipment was in stalled was detailed by Mr. Laffin, electrical engineer for Dominion Coal. Having identical units eased the problem of changing over in very limited time. However, a great deal more engineering and detail work was required than normal, and all units and components were supplied as complete as possible by the manufacturers.

Protective features include a "mansafety" lever which reduces the overspeed limit, as well as limit switches for hoist and lower, and a "timed overtravel" position on the "test" and "run" selector switch, which permits taking the cage beyond normal limits for handling materials and equipment. Also, the control circuit is arranged so that, after an overwind in normal operation, the operator can "back out" in the normal direction only.

#### Explosive Design

Explosives formulation was detailed by G. R. Phare and J. F. C. Dixon, Explosives Dept., Canadian Industries, Ltd., with Mr. Phare handling the presentation. Particular formulations are dictated by desired field performance, which in turn is dependent on such physical properties as strength, velocity of detonation, sensitivity and water resistance. Design also reflects detonation actions and rock mechanics theory, including fragmentation by reflection and the crater theory of attaining peak efficiency in explosive use.

#### Power From Coal

Development of steam-generating facilities for the Nova Scotia Power & Light Co., Ltd., was detailed by A. R. Harrington, general manager, to open the third technical session, with Mr. Goudge presiding. Although production was and still is primarily or heavily hydro, the first of the modern steam units was built in 1944. Continued land growth resulted in additional installations of larger-sized units, culminating in a 45,000-kw addition to Halifax plant in 1957 operating at 900 psi and 900 F. A second such unit is scheduled for 1959. The unit is supplied with steam by a cyclone-fired boiler designed to use a wide range of coals or heavy fuel oil.

#### Mine Safety

Operation and accomplishments of the federal inspection program in the United States were outlined by Harry F. Weaver, chief, USBM Div. of Coal Mine Inspection. Results in anthracite include the following: fatality-frequency rate, anthracite, 10 yr before inspection, 1.61 per million man-hours; nonfatal rate, 105.94; 10 yr after start of inspection, 1.12 fatal rate; 90.19 nonfatal rate: 6-yr period 1952-57, 1.14 fatal rate; 65.66 nonfatal rate; bituminous, 10 yr before inspection, 1.48 fatal rate; 65.81 nonfatal; 10 yr after, 1.19 fatal rate; 55.58 nonfatal; 6-yr period 1952-57, 1.01 fatal rate; 45.18 nonfatal rate.

Tested methods and new thoughts for promoting safety summarized by Mr. Weaver include wet rockdusting, improved underground lighting, accidentprevention training, roof-bolting and resin-bonding of strata, positive ventilation of continuous-miner faces, frameground-equivalent protective devices, research into an automatic power cutoff in case of gas inflow or short on the machine, viscous coatings instead of rockdust, thermoplastic trailing cables, and cooperation with all operator and miner organizations and state agencies in the development of modern legislation and standards.

The concluding session, with Mr. Hartigan presiding, was devoted to the blasting of Ripple Rock, by D. G. Wallace and E. J. Surett, du Pont of Canada; and peat production in Russia, by E. F. Newman, USBM.

#### Rocky Mountain (from p 130)

There have been recent advances in the manufacture of EP-type greases for mining equipment. These advances are the result of demand for products with a wider service range and ability to withstand greater pressures and higher temperatures. Socony Mobil now has available a new product which outperforms regular lubricants. It is a multipurpose grease with the features of an extreme-pressure lubricant.

The new grease makes possible a saving because one grade can be used in place of many special types. Socony Mobil expects to eliminate up to eight products with this grease in the future. The new product may be dispensed with any present systems. It is water resistant, stable, has a long life, protects against rust and corrosion and lubricates better than conventional products. It has been proven in tests in various tough conditions.

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#### CUTS 95% OF MAINTENANCE

NO FRICTION-The trolley shoe never touches the contactor

UNLIMITED LONG LIFE—Nothing to wear out because there is no physical contact between the contactor and trolley

NO REBOUND POSSIBLE—No false signals or switch operation from contactor rebound as is common with mechanical types

OPERATES AT ANY SPEED—No train is too slow or too fast to allow positive operation

POSITIVE DIRECTION SENSING—Directional control circuits are made in a quick, positive and dependable manner.

NO BURNED OUT COILS—Unique circuitry prevents the burning out of control relay coils often caused by the locomotive stopping on the contactor.

THIS PRODUCT
IS TESTED . . .
PROVEN AND
CURRENTLY
IN MINE USE

## **GENERAL**

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LOUISVILLE 6, KENTUCKY

#### ROOF BIT, AUGER TYPE APT Style

Cuts clean, straight, on-gage holes fast in soft or medium formations; the strong braze protects tip.



#### ROOF BIT, SOLID-INSERT PTV Style

New forging design for extra tip support; open body design for faster drilling.

MACHINE BIT.

NEGATIVE RAKE

CC-8 Style Cutting edge is stronger . . . receives greater support from increased lip angle. Tip, in compression, utilizes maxi-mum carbide strength.



Thicker, stronger cutting tips with extra steel support for the most rugged operating conditions.



MINE-ENGINEERED CARBOLOY BITS REDUCE COAL CUTTING COSTS



FULL PADIUS CCA-1, CCH-6 Styles

Resist side wear and drag to increase tool life, lower power con-sumption, and reduce "bug" dust.



#### MACHINE BITS, ENCLOSED TIP CCS-2, CC-11 Styles

The carbide tips, enclosed in steel, resist breakout are held firmly by a combination of braze and mechanical holding.



#### AUGER BIT, MACHINE-MOUNTED

AD Style (Square and Hex Shank) Wide throat and stallfree design for top performance under all cutting conditions.



AUGER BIT, HAND-HELD

ADN Style (Square and Hex Shank) Long, on-gage tip for clean, straight holes. "V" prong for faster penetration with less pressure.

Carboloy mining tools cut more efficiently, have long life . . . and are backed by 30 years of continuous carbide research

General Electric mining tool engineers constantly study underground methods to supply you with tools that have the most efficient design for each mining operation. Each tool is tipped with Carboloy cemented carbide that has passed 29 separate control checks in the manufacturing process. You get uniform, completely dependable performance from every tool . . . and that means lower cutting costs per ton.

The full line of Carboloy mining tools is available for immediate delivery in every mining area. Your Local Authorized Carboloy Mining Tool Distributor has the right Authorized Carboloy Mining Tool Distributor has the right bit for every mining job. He will be glad to give you addi-tional information or underground assistance. Or write: Metallurgical Products Department of General Electric Company, 11120 E. 8 Mile Street, Detroit 32, Michigan.

## CARBOLOY.



COAL AGE . August, 1958

## Foremen's Forum

## Employing the Whole Man

Increasing mechanization of mining operations requires finer skills in the workmen who actually run the machines.

The essence of good supervision now is providing the kind of leadership that brings out the full talents of these men.

IN THE HANDLOADING DAYS it was relatively easy to tell whether a man put out a good day's work. You only had to watch him work. If his shovel was filled, lifted and emptied into the car at a steady rate, he was doing his job. He needed only physical health to be able to continue to turn out his day's work. However, each new development in the application of machines in coal production adds new dimensions to the jobs of workers and supervisors. The mental attitudes of the workman directly affect his day's work. He now needs more than physical health alone. His job now requires mental alertness and manual dexterity.

It naturally follows that since the workman must possess greater skills the foreman must be a better leader. It is only within the very recent years that the coal industry has been able to establish reliable standards on what is a good day's work for a man-and-machine team, and the standards are not universal yet. The burden of achieving high production rests upon the foreman. He must somehow challenge the operators of the equipment to do their best in stituations where "best" may not be clearly defined.

In the old days it was possible for the hand loader to keep up his loading rate even though his mind might be occupied with personal problems. Nowadays, however, the man at the controls of a machine worth thousands of dollars should be completely absorbed in the productive use of that machine. A supervisor cannot be expected to eliminate the personal problems of all the men he leads. However, he can create a challenging atmosphere in the section during working hours. This may help to push personal problems from the top of the workman's consciousness.

Now the big question is: How does a supervisor create this challenging atmosphere? Here are some suggestions which will be of help.

 The supervisor must realize that the company has a tremendous investment in the man as well as in the machine.

The training of a good machine operator represents a lot of time and money. After a certain period of time, the carefully selected man will make fewer costly mistakes and fewer nonproductive moves with the machine. He will become better acquainted with the operating principles of his unit. He will then be better qualified to decide when he should shut down and call for service to prevent major damage. As a man develops these skills his sense of personal worth increases. He is now a responsible man, and his opinions in matters concerning his machine should be honored. A good operator can simplify and improve his own job better than anyone else, his supervisor included. If he has a reasonable suggestion for job simplification, don't make him continue to do things the hard way. The challenge to him is gone if you do.

#### The supervisor must understand that all men do not work for money alone.

The surest proof of this is the supervisor himself. In coal mining, most bosses have come up through the ranks to their present positions. Making the grade required extra effort, beyond the minimum for which pay is received. The young machine operator in your section may have the same ambitions. It pays to remember that some of the hardest workers in the land are men who have enough wealth to sit back and take it easy. On the other hand, we all know lazy folks who won't work even though the source of their next meal is uncertain. These are generalizations. The truth undoubtedly is somewhere between-men of course work for money, but they also work to satisfy other drives. They want to participate as members of teams.

#### The supervisor must set up situations in which teamwork can be demonstrated.

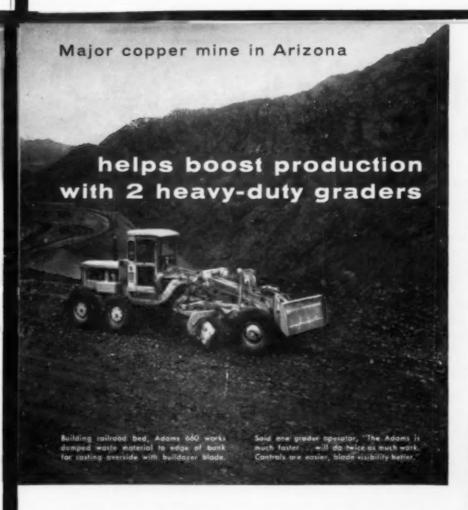
One of the first requirements in leadership is that the would-be leader show enthusiasm in pursuing the goals that have been set before the group. The next requirement is to stay close to the group, not so far ahead or so high above that the group closes within itself, leaving the leader "out in the cold." leader and his followers will be a closeknit organization if the leader clearly explains the goals to be achieved. The team spirit will be further intensified if the leader shows concern for the team member who is having a run of hard luck on the job. The other men will take their cue from the leader, and begin to weld a cooperative, smooth-working crew. This is a better atmosphere in which to work than in a situation that leaves "every man for himself."

#### The supervisor must give credit where credit is due for superior performance.

This requires a sincere effort on the part of the crew leader to recognize instances in which individuals have made good contributions to the team. An enthusiastic team will provide many opportunities for passing out laurels. We like to have our achievements recognized. This is one of the reasons human beings like to participate in congenial groups. It is one of the rewards, other than money, for which we work.

#### The good supervisor will be a strong team-worker within his own group and for his own leader.

The man who dares to lead must also know how to follow with loyalty. He must be willing to contribute to the job of reaching goals set before his own immediate supervisor. In doing so, he grows in ability and gains skill in seeing the total job through the eyes of the people in his own crew. Thus he is able to think ahead and to plan his next moves, which is what a good leader is supposed to do.



At a large open-pit mine in Arizona, ore is mined at low levels and hauled by railroad cars . . . at higher levels, overburden is removed by a fleet of 35-ton trucks. To help these haulers travel at safe, profitable speeds, and to speed road and railspur construction - the mine uses two 150 hp Adams\* 660 graders.

#### Patrols roads 24 hrs. a day, 6 days per week

One of the heavy-duty "660" Le-Tourneau-Westinghouse units is used primarily for maintaining many miles of haul roads. This fast-moving grader patrols these busy mine roads 24 hours a day, 6 days a week. It goes wherever needed . . . to fill ruts, level washboard, clear debris dropped by overloaded haulers and improve drainage.

For working along steep drop-offs, the Adams' standard blade extends a full 71/2 ft. beyond wheel line, to give operator safe working margin. Extra-safe dual-braking system stops transmission as well as tandem drive-wheels for sure, safe stops and minimum brake wear.

#### Helps build new roads, RR grades

The second "660" grader—equipped with bulldozer blade - is used on new construction work and for maintaining waste dump. When constructing new roads or railroad beds, the "660" handles all the blade work.

#### Works any kind of material

Wide range of speeds give Adams advantage for working efficiently in any kind of material. All 80 to 150 hp Adams graders have an 8 forward and 4 reverse speed transmission. In addition, optional 3speed "creeper" gears (0.23 to 1.82 mph) may be added. These low, fullpower speeds move heavier loads, handle rocky material with greater speed and safety, insure more accurate blade control for fine finishing around forms or obstructions.

Adams' largest grader — the powerful 190 hp POWER-Flow 660, with torque converter - gives you an infinite number of speeds forward to 27.4 mph...reverse to 24.4 mph. Adams' smallest, the 60 hp "220", has 5 speeds forward to 18.3 mph best in its class.

#### See Adams in action

Why not see how you, too, can step up mine and quarry production, cut operating costs - with heavy-duty Adams graders? There are 7 models: 190, 160, 135, 123, 115, 80, 60 hp. Choice of GM or Cummins engines on 6 larger models. 190 and 135 hp models have torque converters.



With dozer blade, "660" maintains waste dump. Over 72% of the total amount of material mined at this copper mine is waste.

Powerful "660" helps build exploration roads and RR road beds fast and easy. Commenting on the Adams grader, the second operator said, "I like the power and weight of the '660'. Also, the big 14-ft, maldboard and wide choice of speeds.



\*Tredemark G-1483-M-1



Where quality is a habit



Organizing for Maintenance

By Ernest W. Fair Boulder, Colo.

A DAB OF OIL HERE, a twist of a wrench there, a tightening of a belt, adjustment of tension now and then—all of these constitute maintenance of a sort; the wrong sort. All are haphazard. Good maintenance is never haphazard. It is planned and carefully programmed in even the smallest company. Without such planning equipment life is wasted, production dollars are allowed to fritter away and costs rise on every day of operation.

Maintenance should be set up and regulated to fit the equipment and schedules in each particular company, for no two are exactly alike. Literal adoption of a tight schedule as used by one organization may be utterly useless and wasteful in another.

However, there is a basic skeleton around which a maintenance program should be built. With this skeleton, presented in the following paragraphs, any manager can set up a program of his own. It suggests the individual points that should be a part of his own tailormade maintenance plan or program.

1. Responsibility — Determining who will be responsible for application of the program after it has been drawn up is essential. Without fixed and definite responsibility on one individual in the organization the program itself will falter, no matter how good the plan.

In turn there must be a definite degree of responsibility assigned to every man on the staff who uses any equipment. They should each know and understand the maintenance plan and particularly their own part in carrying it out.

2. Financial support of the plan is vital—The program should always take care of this phase of maintenance, and the sums allotted it should be flexible enough to take care of unusual conditions and circumstances.

Approval of management may be required, under the program where estimated cost of labor and materials exceeds a certain amount, say \$25, and thus a degree of control retained over the costs of the program. Minor expenditures can best be left to people in the organization concerned with maintenance in order to avoid useless record-keeping on the part of the man in charge of the maintenance program.

It is extremely difficult to set up a fixed sum for maintenance, since break-

downs, unforeseen high production schedules and other factors may cause wear and tear on equipment well ahead of schedule. The budget should have a degree of flexibility which will allow for the unforeseen.

3. Maintenance records are vital to any good program—They should be set up at the very start and maintained as religiously as are the records on receipts and expenditures in the front office. The best procedure is to set up an individual card record for each piece of major equipment. This card should detail the maintenance history of that piece of equipment. Usually such records are kept in the office of the individual placed in charge of the maintenance program and are kept by him.

4. Work schedules for periods directly ahead should be part of the program—These should be made up on three classes of work: (1) jobs which can be definitely planned ahead, such as inspections and routine procedures, (2) jobs which may vary with conditions but nevertheless must be fitted in at approximate times, and (3) jobs which must be done as emergencies arise. Flexibility in the master schedule is needed to handle the latter type of maintenance work.

5. A good tickler file is also a vital part of any maintenance program-This should be arranged to provide work orders and data on forthcoming jobs to be done. Such a file should show all maintenance jobs that have been definitely scheduled for fixed dates with accompanying "check" spaces for initialing that the job has been done. A warning system is also an aid in such a file. An additional card of another color set up from a week to two weeks ahead so that if any preliminary planning need be done or parts ordered everything can be ready for routine maintenance on the scheduled date.

6. A daily work program is the next step in the schedule—This should be made out from the outline of work ahead and fitting in emergency jobs for which orders or requests have just been received at that particular time. Without these records maintenance easily becomes haphazard. With records of this type even the minutest maintenance procedure acquires fixed standing and responsibility and is certain to be handled properly at the right time.

7. Maintenance materials requirements should also be calculated when the program has been set up—When this procedure is followed control of cost of maintenance is much closer. This also assures that funds will be available for such maintenance work as the need arises and that nothing need ever be postponed because of lack of funds at any particular time. This is one of the major shortcomings of maintenance in many companies today. Each time needed maintenance is postponed the life of a piece of equipment is shortened by every day that passes without the proper maintenance work being done.

8. Obtaining the proper information and data for correct maintenance is also an important part of any such program —A file of service and maintenance literature as supplied originally by the manufacturer of each piece of equipment should be set up. Where these have been lost replacement should be secured immediately. This helps keep out mistakes in maintenance which can sometimes be as costly as complete absence of maintenance.

Such a file should also contain lubrication charts an other maintenance data from every possible source. Information carried in the pages of this magazine from month to month should be kept available for not only routine maintennance procedures but as a source of data when something unexpected arises and there is no available experience on the staff to handle that situation.

9. Any good maintenance program also allows for periodic training—The overall job of good, low-cost maintenance is always much easier accomplished when everyone on the staff is maintenance conscious and kept that way through a periodic maintenance demonstration or discussion. The same attention that we give to safety today should apply to maintenance. The results are just as important.

#### Engineer vs Salesman

We offer the following definition which we overheard somewhere years ago:

An engineer is a specialist. He is a man who knows a very great deal about a few things in particular. He continues to specialize, learning more and more about less and less until finally he knows everything about nothing.

A salesman, on the other hand, in order to be on his toes, has to know a little something about a great many things. Hence, he continues to learn less and less about more and more until finally he knows nothing about everything.

## Here's why it pays to bolt your roof



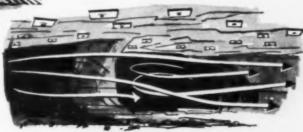
Reduces rock falls . . . improves safety



Permits wide haulageways . . . increases clearance



Makes mechanized equipment easier to maneuver



Improves ventilation . . . no bulky supports to store

With roof bolting, mechanized equipment no large can be worked close to the face, due to the absence of bulky supports. In addition to permitting

wide openings and clearances, roof bolting
also improves ventilation . . . minimizes the need for
storage space . . . eliminates fire hazards.



To meet virtually every roof condition, Bethlehem makes headed roof bolts in 3 diameters:  $\frac{5}{8}$  in.,  $\frac{3}{4}$  in., and  $\frac{7}{8}$  in., having typical breaking loads of from 24,000 lb for the  $\frac{5}{8}$ -in. bolt to 45,000 lb for the  $\frac{7}{8}$ -in. bolt.

If you'd like to know more about roof bolting, write us at Bethlehem, Pa., and we'll have a representative call at your convenience.

SLOTTED BOLTS, TOO. For use in certain types of rock, Bethlehem also makes a 1-in. slotted roof bolt, which is used with a steel wedge. Ask for details.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. On the Pacific Coast Bethlehem products are sold by Bethlehem
Pacific Coast Steel Corporation. Export Distributor. Bethlehem Steel Export Corporation.

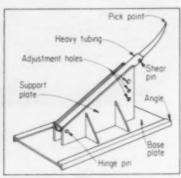
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COAL AGE

## Operating Ideas





#### Roof Scaler Boosts Production 20%, Increases Safety

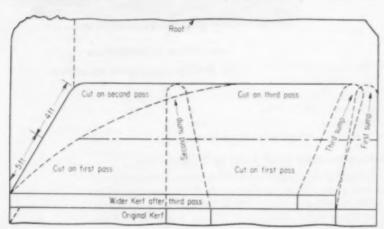
SCALING DOWN COAL that sticks to the roof is now a mechanical operation requiring a minimum of human effort. A device developed by Anthony Shacikoski, mining consultant, Avonmore, Pa., fits onto the loading head of a loading machine and enables the machine operator to use the power of the machine to take down coal sticking to the roof or scale down bony or loose rock.

Not only is the hard, slow manual method eliminated, but also safety for workers is increased and the job is done in a minimum of time. Production has been increased by as much as 20% where the device is used. A loading machine operator can take down 18 in of bony in a 28-ft room in about 12 min. Mr. Shacikoski says that in mines where bony coal or rock had been taken down after coal was loaded out, men assigned to that work now are available for other duties. An added benefit resulting from using the device is greater safety for workers because the machine operator is 16 ft or more back from material being scaled.

The roof scaler consists of two heavy vertical support plates welded to a base; a tubular pick holder that is mounted on a pin that fits between the two vertical plates; and the pick itself, which fits inside the pick holder and is held in position by a shear pin. The shear pin also protects the loading machine against overloading if the pick is pushed too hard.

Vertical positioning of the scaler is done easily by raising the pick to the roof and then placing a bolt through the nearest holes in the support plates. Then the machine operator raises the loading head as much as necessary to bring roof scaler up to the proper height for taking down the coal or rock.

The roof scaler fits under two angle irons welded to the loading head. It can be put in place or removed quickly.



#### Three-Step Cutting for Face Preparation

SIX MAJOR BENEFITS are credited to a three-pass method of undercutting coal developed by Loren (Bud) Wonder, cutter operator at Enoco Collieries, Inc., Bruceville, Ind. As a result of using the method, the company gets maximum tonnage per cut in 28-ft rooms without

sacrificing loadability and without having to bugdust each cut by hand.

John Stachura, Enoco's general superintendent, lists the following advantages of the three-pass method:

1. Cut output is increased approximately 9 tons.

- Less power is consumed by the cutter resulting in less cable heating.
- Need for bracing machine often is eliminated.
- Loadability is improved and "hung cuts" are prevented.
- 5. Cutting time is reduced about 2 min per cut.
- 6. Less damage to Airdox coal-breaking shells.

Here is how the cutting is done:

Step 1—Sump the cutterbar full length on the right side of the place and on a level desired as the bottom.

Step 2—Retract the bar to a depth of 5 ft and continue cutting across the face.

Step 3—Re-sump the machine about midway across the place to the full length of the bar. Cut across the place at the original level.

Step 4—After completing Step 3, resump the machine at the right side for the full length of the bar. But elevate the heel of the cutterbar about 10 to 12 in so that fines can be deposited without being carried back into the kerf by the chain. This step clears the kerf of cuttings.

## THE SPLICE OF LIFE

When you splice and reinsulate with Uskorona® and re-jacketwith "D.R." splicing compound, you renew the life of the cable. The entire splice will last as long as the cable.

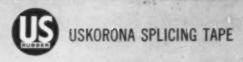
These entirely reliable tapes are:

- Extra-tight gripping, plus high in tensile strength.
- Resistant to acid, alkalies and moisture ...ideal for use on mining machine cables.
- Impossible to pinhole, so dangerous leaks can't occur.
- · Absolutely waterproof.

Uskorona exceeds A.S.T.M. specifications and can handle a wide range of electrical and general purpose jobs in mines. A complete line of mine tapes is available.

When you think of rubber, think of your "U.S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.







ABOVE GROUND. When spliced with Uskorona and "D.R." tapes, cables become perfect again. These splices restore the mechanical and dielectric quality of the cable, resist severe abrasion and exposure to moisture.



BELOW GROUND. Being run over by cable cars in coal mine can't hurt Uskorona splices protected by "D.R." splicing compound. They take this punishment many times a day.



Mechanical Goods Division

**United States Rubber** 

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCT

Rockefeller Center, New York 20, N.Y.

In Canada: Dominion Rubber Company, Ltd.

### Operating Ideas (Continued)



### Better, Low-Cost Fan Signal

A SAVING of 50% in installation and labor costs of a new fan-signal system at Buckeye Coal Co., Nemacolin, Pa. was achieved by using a special control cable with a messenger already attached. Working in near-zero weather, chief outside electrician George Schiffbauer and a seven-man crew completed the job of installing 16,000 ft of control cable through hilly and heavily wooded terrain in 14 days.

Secret of the speedy installation, says Mr. Schiffbauer, is that the cable came equipped with a messenger already attached. "If it had not been ready for immediate use we would have had to purchase the necessary equipment ourselves. Then, too, a special unit would have been required to spiral the wire tying the messenger to the cable. Installation time would have been doubled with conventional methods and equipment."

Under the new system, all three of Nemacolin's mine fans can be watched from the central power station. A flashing light in the control room tells the engineer on duty when all fans are operating perfectly. In case of a fan failure a hom sounds at the control booth and a maintenance crew can be dispatched immediately. In the past only the No. 1 fan was connected to the central power station, Nos. 2 and 3 were linked together and an engineer stationed at No. 3 could watch the operation of both fans.

Mr. Schiffbauer says, "The cable messenger played a vital role in the installation. We wanted the cable strung 20 ft above the ground. A strong messenger is a must in this kind of an installation. We needed a 12-conductor cable because there are six circuits in the system, including one spare."

The new system will incorporate 24,000 ft of 12-conductor cable made by Rome Cable Corp. Each conductor has seven strands and is insulated with polyvinylchloride and color-coded for positive identification. These conductors are covered with a bare-copper shielding tape under a %<sub>0</sub>-in polyvinylchloride jacket. The cable's O. D. is 0.66 in. A %<sub>0</sub>-in copperweld messenger is attached.

Because the cables are strung near the West Penn Power Co.'s 25-KVA lines, copper shielding is required to prevent a buildup of static electricity which would overcome the low voltage in the conductor cable. This would result in false signals at the mine's central power station.

### Old Bus Is First-Aid Room

AN OLD BUS plus some ingenuity and a minimum of cash outlay resulted in a neat, low-cost first-aid room at the Hanover Coal Co., Hanover Township, Pa.

Hanover Coal bought a bus that was retired from transit service in the Wilkes-Barre area, removed all but a few seats and remodeled the interior into a spic and span first-aid room. Electric circuits were installed for lighting and resistance heating and the entire interior painted. All windows are covered with sections of old sizing screens from the company's preparation plant.



### Mine Car Made Into Fire Truck

HERE'S ANOTHER fire-fighting unit that was built by remodeling a mine car. Now in service at the Elk River Coal & Lumber Co., Widen, W. Va., the mine fire truck was built in the company's shop. It is housed in a fireproof room near the mainline track.

A Differential 12-ton car provides the base for the unit. The car's interior was sealed, divided into compartments with baffles and then covered to provide storage for 1,200 gal of water. A small section at one end remains open and holds a pump, motor, valves and tool box. The pump can deliver 100 gpm at a nozzle pressure of 100 psi.

Pump connections are designed so that water may be pumped directly from the tank or a sump to a fire, or from a nearby source to refill the tank. The car also contains portable chemical extinguishers, brattice cloth, tools and supplies.



EASY TO INSTALL G-E Cabinetrol\* control requires minimum of maintenance. Centralized panels are adaptable to any type of sequencing.
\* Registered Trade-mark of General Electric Co.



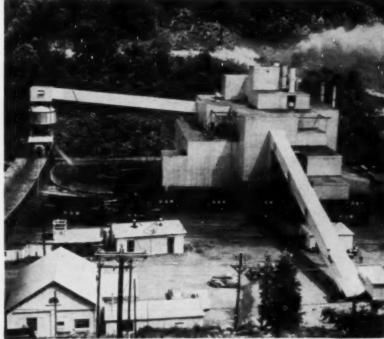
DEPENDABLE POWER to drive a slope belt, which moves coal from mine to plant, is provided by 200-hp General Electric Type KG high-starting torque motor.



RELIABLE PERFORMANCE in any weather is provided by these three G-E 833-Kva transformers which deliver uninterrupted power for Moss #2 preparation plant.



EASILY OPERATED main control panel, engineered by Link-Belt Company using G-E components, functions as nerve center for coal preparation plant operations.



MODERN, EFFICIENT G-E power system helps achieve production of 6500 tons per day.

Efficient G-E electrical system helps
Clinchfield Coal's Moss #2 produce...

### 6500 tons per dayautomatically

Moss #2—from mine through preparation plant—is electrically equipped by General Electric, to meet increasing production demands

To meet steel industry demands for a high quality metallurgical coal, Clinchfield Coal Company, division of the Pittston Company, opened Moss #2 mine, Russell County, Virginia, in 1956. To achieve a high degree of production, a new, fully automatic coal preparation plant with a capacity of at least 6500 tons per day was constructed.

Working closely with the Link-Belt Company—which designed and built the complete, automatic preparation plant—as well as with Clinchfield engineers, General Electric engineered an electrical system to handle today's production requirements with built-in capacity for tomorrow's needs.

Ranked as one of the coal industry's most modern mines, Moss #2 is an excellent example of the progress made in the application of electrical equipment to coal preparation plants.

Your nearest G-E sales representative can call in General Electric application engineers to help design an efficient electrical system for your plant. Call on him early in your planning stage.

For free copies of bulletin GEA-5308A, Modern Electrical Systems for Coal Preparation Plants, write to General Electric Co., Section 663-50, Schenectady 5, New York.



Engineered Electrical Systems for the Coal Mining Industry



### **Equipment Developments**





### Potent Roof Bolter for Low Coal Features More Stamina

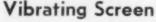
Chicago Pneumatic Co., New York 17, N.Y., has announced its new RBD-30-579 roof bolting machine. C-P reports it features: (1) 30% step-up in motor horsepower; (2) 40% increase in gear strength which provides heavy-duty stamineded for increased speeds; (3) built-in motor fan; (4) a clutch which slips on over-load to prevent stalling; (5) low

28-in height gets into low seams; (6) one motor drives both ruger and bolt setter; and (7) solid wheel brakes help save time. The RBD-30-579 is able to drill the hole and set the expansion bolt in less than 3 min. The unit, which is available in self-propelled models and with additional equipment, can drill in slate, shale and laminated limestone.



### **Boring-Type Continuous Miner**

A boring type continuous miner with an adjustable height range for coal as low as 5½ ft up to coal as high as 7½ ft has been announced by Goodman Mfg. Co., Chicago 9, III. The versatile 425 continuous borer is powered by a single 250 hp AC or DC motor and has a rated 8 tpm capacity at any height within its range. At 5½ ft it cuts an 11-ft width, at 7½ ft the width is 13 ft. The sides of the opening are arched for strong roof support; the bottom is wide for good roadway; the roof span is flat and narrow. Features are cited as: (1) easy maneuverability in development or production work; (2) simple, clean, accessible design; (3) roof bolting drills can be attached to permit bolting ahead of the operator and at the left-hand side.



Link-Belt Co., Chicago 1, Ill., has brought out the new heavy-duty straightline horizontal vibrating screen shown



above. Designed for dewatering, washing and sizing a wide variety of materials where head room is limited, the new srecen can be cable suspended or floor mounted. Two outstanding features of the CL-Model 58 are said to be the mounting of vibrator gears on tapered shafts to make replacement of cartridge-mounted bearings faster and easier, and the bolting of the double or single screen decks to side plates for ease of removal. The model, which comes in 15 sizes ranging from 4x8 ft to 6x16 ft, has a screen snubbing device, and can be equipped with wash troughs, electrically heated and bouncing ball decks, and other equipment.

### High-Voltage Cable Coupler

Convenience and safety are the highlights of new AC cable couplers made by PLM Products, Inc., Cleveland 11, Ohio. The couplers, which are rated up to 7,500 V, are designed to



# OP ROOF BOLTING UNIT

### Completes entire bolting cycle-on the double!

Less than 3 minutes! That's all it takes the new RBD-30-579 to complete an entire roof bolting cycle from hole drilling to bolt setting. (Where hole depth is less than 36", the entire cycle can be completed in 1½ minutes.) New stepped-up motor HP gives it 30% more power . . . New 40% increase in gear strength means

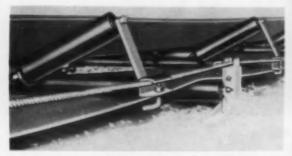
beefed-up capacity in auger and bolt setter gear train . . . New built-in cooling fan yanks heat away from enclosed motor, adding life to insulation. Furnished with low speed spindle adapter for slow speed drilling plus low seam drilling attachment for low coal. Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.

### Chicago Pneumatic 8 East 44th Street, New York 17, N.Y.

PNEUMATIC TOOLS . AIR COMPRESSORS . ELECTRIC TOOLS . DIESEL ENGINES . ROCK DRILLS . HYDRAULIC TOOLS . VACUUM PUMPS . AVIATION ACCESSORIES



permit the wider use of high-voltage AC current in open-pit and deep mining operations it is noted. Each coupler consists of plug and socket with three contacts for conducting power and one for grounding. Contacts are mounted in and insulated by single-piece, heavy-duty pressure-molded insulators. Safety features are cited as including complete enclosure of connections; optional electrical and mechanical interlocks to prevent unauthorized disconnection; heavily-threaded, protective aluminum housings which must engage before any electrical contact is made—and will not disengage before electrical contacts are broken; and optional contacts for ground continuity checks. The 42-in long, 300-amp unit comes with covers to protect plug and socket when separated and not in use. A heavy-duty sled base and 2-, 3- or 4-way assemblies are also available.



### Low Rope Highlights Conveyor

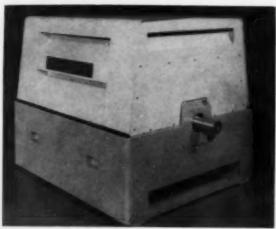
Automatic self-training of the belt is claimed to result from the position of the rope, which is placed lower than the carrying idler and carrying belt, in this new Lo-Rope conveyor design by the Long Co., Park Hill, W. Va. A major feature of the design is ability to operate in the lowest coal since carrying belt height can be as low as 9 in above the mine floor. Another important benefit is that ropes, support stands, and idler connections are completely out of the way of the carrying run of the belt. Deep troughs, at a fixed 27-deg angle, center the load, reduce spillage and permit wider spacing between idlers. Anchors with built-in tensioning devices and quickacting rope clamps, and adjustable rope-support stands, are other features. Lo-Rope intermediate structures are available with either a mobile self-tramming conveyor drive (models up to 40 hp), or with a skid-mounted drive unit, and can be used with existing terminals.

### **New Miners in Heavier Models**

Increased capacity of from 4 to 5 tpm over older models is claimed for two new Lee-Norse Miners made by the Lee-Norse Co., Charlerol, Pa. A 25% increase in weight, most of it in the cutting heads, brings the total up to 25 tons and adds greatly to the efficiency of the units. Special features of the machine are added power with only three identical motors used, no water cooling, heavy-duty electric controls and ex-



treme maneuverability. Tramming speeds range from 50 to 100 fpm. The CM37 (37 in high) cuts a maximum of 7 ft 3 in high and the CM 47 (47 in high) cuts a maximum of 9 ft high. The 14-in-wide crawler treads and the 24-in-wide conveyor are driven by hydraulic gear motors applied directly to the gathering heads.



### Accessible Motor Design

The picture above shows why Westinghouse Electric Corp., Pittsburgh, Pa., calls their F/A (fully accessible) line of large AC motors a new concept in design. Some key advantages are said to be: (1) quick easy removal of enclosures which allow thorough stator inspection, replacement of enclosure requires no realignment; (2) protruding conduit box eliminated; (3) noise mufflers, air filters, etc. can be added without redesign of basic parts; (4) standardization possible because each F/A frame size replaces 16 of the previous line; (5) and precision manufacturing methods and improved construction schedule speed service. The complete line of Westinghouse squirrel-cage, wound rotor, and synchronous motors from 250 to 7,000 hp for all horizontal utility and industrial drive application is reported to have been completely redesigned for the new line.



### Inspector's Friend

"Inspector's Friend" is the name of a new multipurpose utility car offered by the Long Co., Oak Hill, W. Va. The 3-wheeled rubber-tired vehicle is battery-operated and has a

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### B.F.Goodrich tires haul coal uncovered by world's largest shovel

Big Paul takes a 70-yd., 105-ton bite of overburden at the Peabody Coal Company's River King mine near Freeburg, Ill. This world's largest shovel towers 147 ft. 6 in., can dig, hoist, swing and dump its load in 50 seconds! The coal it uncovers is hauled by truck to the preparation plant 5 miles away. The road has a rock base—and loads run as high as 80 tons. Peabody assigns this rugged hauling job to B.F.Goodrich Rock Service tires. Here's why:

Rock Service tires are built with B.F.Goodrich FLEX-RITE NYLON cords that withstand double the impact of ordinary cord materials, resist heat blowouts and flex breaks. No wonder the FLEX-RITE NYLON body outwears even the extra-thick Rock Service tread, can be retreaded over and over!

Husky Rock Service cleats grip the ground for positive traction in forward or reverse. The tire is built to flex evenly—no localized strains that cause unnecessary tire failures! See the new B.F.Goodrich Rock Service—tube-type or Tubeless—at your B.F.Goodrich dealer's. He's listed under Tires in the Yellow Pages of your phone book. Ask to see his complete line of tires for every mining job. B.F.Goodrich Tire Co., A Division of The B.F.Goodrich Co., Akron 18, Ohio.

Specify B. F. Goodrich Tubeless or tube-type tires when ordering new equipment

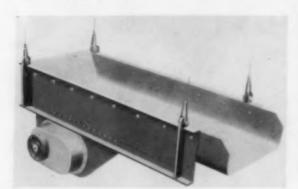


### B.F. Goodrich truck tires

COAL AGE . August, 1958

C The B.F. Geodrich Common

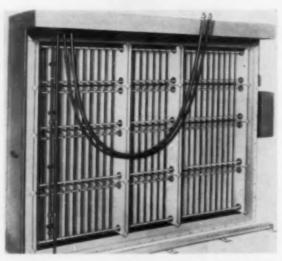
capacity of 500 lb plus operator. Although similar to cars widely used in industrial plants, it is noted that the car has been specifically designed for coal mine use. Its special features include high maneuverability and two full shifts of operation between battery charges. It is manufactured in either open or permissible type electrical construction, and in three tramming heights (24, 36 and 60 in). Other specifications are: width, 52% in; length 103% in; speed, 4 mph. Suggested uses, in addition to transportation of supervisory personnel, include transporting supplies.



### Versatile Vibrating Feeder

Shown above is Link-Belt's versatile new straightline geared counterweight vibrating feeder. The unit, designed for controlled feeding of a wide range of bulk materials at high rates, is said to be able to absorb great impacts, and can be mounted directly under a hopper or bin to feed, convey, pick or scalp high tonnages of materials, including lumps up to 36 in diameter. A geared eccentric shaft mechanism produces a high intensity straightline stroke. Link-Belt, Chicago 1, Ill., points out that the machine is especially useful where the rate of feeding bulk materials must be controlled and the headroom is limited. The machine, which lends itself to a variety of

adjustments, is available in a wide range of dimensions for floor or suspension mounting.



### High Velocity Precipitator

A new high-velocity, electronic dust precipitator introduced by American Air Filter Co., Inc., Louisville 8, Kentucky, is reported to reduce face area by 30% and cubic requirement by 50% over conventional precipitators. The "Electro-cell" unit operates at face velocities up to 600 fpm with tested efficiencies up to 97%, as measured by the U.S. Bureau of Standards method. Cell capacities range from 800 to 2,750 cfm for the all-aluminum cells. Heights of 16 and 20 in, and widths of 24 and 36 in are available. Features include vertical ionizing wires in each cell rather than in a separate section, lowered initial and installation costs, simplifications in automatic washer and oiler, and lowered power requirements.



### Versatile Mobile Drill

A new mobile drill, the B-40 Explorer, specifically designed for augering, core drilling and large-diameter earth boring, has been introduced by Mobile Drilling, Inc., Indianapolis, Ind. Specifications include: (1) augering to 75 ft, coring to 500 ft, and boring holes up to 24-in diameter; (2) drilling speeds from 62 to

500 rpm; (3) maximum torque of 1,740 ft-lb; (4) 68-in stroke actuated by hydraulic cylinder exerting 7,069-lb lift pressure and 6,283 lb ram pressure; (5) 4-cylinder 36-hp air-cooled engine or any power take-off; (6) any drilling angle from vertical to horizontal; (7) compact size and low weight, permitting mounting on ½-ton carriers. Centralized controls permit one-man operation.



### New Belt Splice

General Splice Corp., S. Norwalk, Conn., has developed a new highstrength flexible lacing for troughed conveyor belts. Designed for quick, simple installation, the heavy-duty hinge-type "Minet" splice eliminates the need for templates, drilling or hole punching. As the conveyor operates, the hinge plate separates into sections at prescored notches to conform with convevor trough curvature. The manufacturer claims that the one-piece design assures closest possible fit which results in a tight, leakproof joint. The Minet splice, available for belts from 316 to 34 in thick and up to 60 in wide, can go pround small-diameter pulleys and makes changing belt sections a quick, simple operation.

### Air Suspension

Reduction in operating expenses is the goal of a new air suspension for tandem axles developed by Hendrickson Mfg. Co., Lyons, Ill. Savings are effected by the "AR" suspension system because its lightweight aluminum construction is claimed to permit higher payloads. Maintenance costs are cut by eliminating shock absorbers, sway bars and lubrica-

## These People Make Your Machine LIVE LONGER . . . WORK HARDER

The structures and physical properties of all metals used in Bucyrus-Erie machines and replacement parts are important factors in their strength and durability. Here, a metallographic microscope is being used to check the structure of a sample of metal.





Bucyrus-Erie Company spends many thousands of dollars every year testing and developing materials for better wearing qualities under specific types of service.

When new metals are employed for better results, and new machinery components are developed, they are passed on to you through the Bucyrus-Erie field service organization—wherever you work.

Every replacement part supplied to you by Bucyrus-Erie is made to original equipment specifications— or better, if new developments have been achieved. The kind of experience found in Bucyrus-Erie's engineering staff and testing laboratories cannot be duplicated by "will fit experts" anywhere.

To keep your machine alive longer, keep it working more profitably, call on the people who designed and built it—call on BUCYRUS-ERIE. 1850

### BUCYRUS

### A Familiar Sign at Scenes of Progress

BUCYRUS-ERIE COMPANY . SOUTH MILWAUKEE, WISCONSIN

Gears and pinions which are subjected to hard usage are carefully flame-hardened to provide long life and extra wearing qualities, extra hardness where drive teeth mesh.

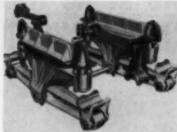
In the Orinoco region of Venezuela, where this Bucyrus-Erie 190-B shovel is loading iron ore, dependability is vital. In remote areas especially there's no place for the "will fit expert".



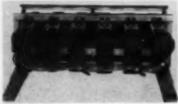


Pittsburg, Kansas

Equipment News (Continued)



tion. Equalizing beam construction reduces the effect of road irregularities by 50% and prevents load transfer from one axle to another. In addition, spring rates are tailored to the amount of weight carried, and leveling valves keep the vehicle frame at a constant height, automatically compensating for any load with variable air pressure.



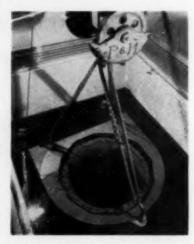
### Underground Capacitors

General Electric Co., Schenectady 5, N.Y., has introduced high voltage capacitor equipment for underground applications. The 50-kvar capacitor units are reported to be suited for application in severely corrosive atmospheres and in areas where submersion could occur. Design features are precision welded, corrosion-resistant terminal boxes for cable connections and 24-in lead-

Wellsten, Ohio

CNALLY PITTSBURG MFG. CORP.

sheathed, rubber-insulated cables hermetically sealed to each phase. The single-phase 2,400-V capacitor units, connected for grounded-wye operation and mounted in a steel rack, are available in 150- and 300-kvar ratings, 4.16 kv. Approximate dimensions are 54x33x22 in.



### Silicone Motor Insulation

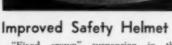
Silicone-rubber insulation, rated for class B temperature rise, is said to give full protection from heat, moisture, dirt, dust and other contaminants in a new line of motors. The "Super-Seal" line, made by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., does away with the need for totally-enclosed motors in many applications because the sealed and vulcanized "Silco-Flex" insulation affords no path of entry to foreign particles. In addition the insulation eliminates heat aging, resists many oils and chemicals and is moisture-proof, the manufacturer reports.

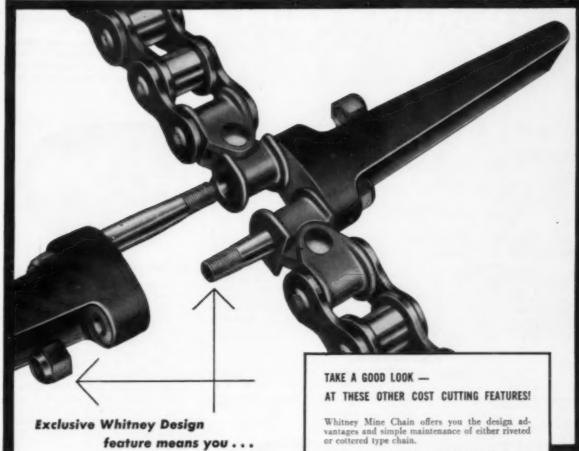


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'Fixed crown" suspension in the M-S-A Skullgard is said to offer a new ease in adjustment while assuring necessary clearance at all times. The hat, made by Mine Safety Appliances Co., Pittsburgh, Pa., is claimed to be mildew-, acid-, oil-proof and easily sanitized. The six major features of the new suspension





### stop Dumping Dollars on the scrap pile!

Whitney Loader Chain flight design featuring tapered studs and self-sealing lock nuts make every Whitney flight completely detachable . . . completely reusable.

This means you can salvage expensive flights for additional service . . . save money ordinarily thrown away with worn out chain.

This is a PLUS feature of Whitney Mine Chain . . . specifically designed for modern mining operations. Whitney design means profitable tonnage and lower costs on your loader and continuous miner operations.

Whitney Mine Chain has solid Stud Bushings . . , provides greater chain pin support by extra rigid design. Self-cleaning, eliminates stiff chain joints. Whitney Mine Chain has forged steel flights and universal joints, 100% Magnafluxed and Mar-Tempered.

Whitney makes a Universal Joint Chain for all type loaders and continuous miners, designed to assure long service life under the most rugged operating conditions.

Whitney manufactures the entire product, both chain and flight, to assure complete integration, balanced design, and a fast, complete customer service.

Whitney distributors, located in all mining areas, carry full stocks of mine chain and American Standard precision steel finished power transmission and conveyor chain. Catalogs on request.

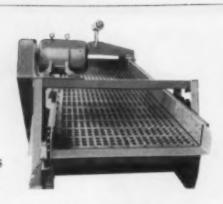
Whitney

315H HAMILTON STREET . HARTFORD 2, CONNECTICUT

ROLLER CHAIN . CONVEYOR CHAIN . SPROCKETS . FLEXIBLE COUPLINGS . WHITNEY-TORMAG DRIVES

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Here's the plate

### that takes the pounding

Hendrick H Quality Steel Plate Screens Coal Easier, Faster, Lasts Longer

Hendrick H Quality Steel Perforated Plate, made from heat-treated high carbon or stainless steel, are your best replacements. This carefully-developed metal is tough and rugged under continuous and heavy use. It screens coal easier and faster, while full clearance reduces downtime due to blinding. Product uniformity is assured throughout the life of the screen.

Order Hendrick H Quality Steel with either flat, corrugated, or stepped surfaces, in any desired shape and with any size of perforation. Whatever you order, you get Perforated Plate which reflects Hendrick's 82 years of experience in selecting the kind of steel the mining industry needs.

### Hendrick

MANUFACTURING COMPANY

41 Dundaff Street

Carbondale, Pa.

Perforated Metal - Perforated Metal Screens - Wedge-Slot Screens - Hendrick Wedge Wire Screens - Architectural Grilles - Mitco Open Steel Flooring - Shur-Site Troods - Armorgrids - Hydro Dehazers - Distillation Column Internals

### BUILT TO TAKE ABUSE!



A truly portable bondwelder built as GUYAN builds everything — RUGGEDLY — to stand up under the roughest use.

Ideal for rail bonding, general intermittent welding and similar work. It will develop 80 to 200 amperes in six proportioned taps. These quick-change tapered plug-and-socket taps assure rapid, easy selection of the proper welding current.

Thin design permits easy removal from cars. And this GUYAN Bondwelder is so easy to handle even in low coal! Haul it from job to job . . . easily and quickly . . . and put it to work immediately.

Guyan BOND WELDERS Don't forget — whether you need a welder for rail bonding, repair jobs in the shops or special welding — there is a GUYAN Bondwelder to meet your requirements.

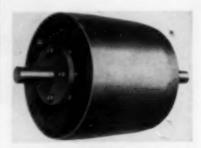
Write for descriptive literature.

GUYAN MACHINERY CO.

LOGAN, WEST VIRGINIA

### Equipment News (Continued)

are: (1) fixed crown clearance, (2) casily changed locked-in liner, (3) no pressure points, (4) air cushion effect, (5) ease of size adjustment, (6) and plastic composition for cleanliness and long wear. Sizes to fit all wearers are available.



### Better Belt Training

Superior training with no belt stretch or wear is claimed for its new pulley by the Stephens-Adamson Mfg. Co., Aurora, Ill. The "Curve-Crown" pulley features an absolutely round rim with a single seam, 100% welded inside and outside for maximum strength, and a new "Squeeze-Lock" hub which eliminates weldments between hub and pulley end plates, and provides sufficient locking forces without the use of keyways. The curve-crown pulley design is said to be based on the fact that training is only necessary when the belt is running off the pulley.



### New Trolleyphone

Clear voice communication over the noise of busy locations and an absolute minimum of maintenance are the design points claimed for the new Model 3000 replacement Trolleyphone by Femco, Inc., Irwin, Pa. Newly engineered components consist of a smaller, more ruggedly built transreceiver unit housed in a steel case, a heavy-duty industrial speaker and a new microphone. All parts are of plug-in construction, and power can be taken from existing AC or DC

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sources. Femco offers the unit as a means of bringing "obsolete communication systems up to date."

### Belt for Mine Use

More flexibility and better troughing characteristics are claimed for a new line of Nycord conveyor belts made by the B. F. Goodrich Industrial Products Co., Akron, Ohio. Nylon cord completely imbedded in rubber is said to greatly increase edge protection, fastener holding ability and impact resistance, and to provide extra protection against damaging effects of acid, moisture and mildew. The belts, which come in Nycord 32-, 36-, and 42-in constructions, are designed for general industrial use.

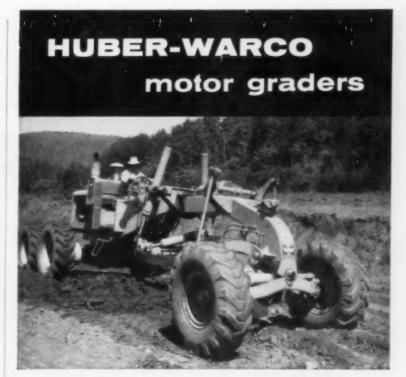


### **Dust-Collecting Stoper**

A dust collecting system approved by the Bureau of Mines is an important feature of a new stoper announced by Le Roi Div., Westinghouse Air Brake Co., Milwaukee, Wis. The company states that the dust is not drawn through the entire stoper. The vacuum is created beyond the filters in the dust collecting box, not by a venturi in the stoper itself. Two feed lengths, 34 and 52 in, and steel changes of 30 and 48 in are available. The S12VT stoper weighs either 92 or 98 lb depending on the feed length.

### Tough Truck Tires

Two tough new truck tires have been announced by Goodyear Tire & Rubber Co., Akron 16, Ohio. The Hard Rock Lug Xtra Tred is claimed to wear longer in rock excavating, mining and quarrying operations because of extra tread rubber. The tire, nylon reinforced, is available in tube-type sizes from 14.00-24 to 18.00-33; tubeless, from



### designed for rugged haul road work

Balanced weight and power to meet every grading requirement . . . that's the Huber-Warco 5D-190 MOTOR GRADER. A 195 h.p. diesel engine in combination with a torque converter, tail-shaft governor and power-shift transmission gives more power at the blade for faster passes and smoother cuts. Operators like the 5D-190 . . . there is NO CLUTCH . . . they just set the desired speed and the tail-shaft governor maintains the speed regardless of load conditions. The complete hydraulic cab-controlled blade movement is another important feature. In less than a minute, and without ever leaving the cab, the operator can move the blade from a 90° bank sloping position on one side to 90° on the other. There are NO manual adjustments to be made. These bonus features add up to MORE grader production. See your Huber-Warco distributor for complete details on the torque converter and standard transmission graders ranging in horse-power from 75 to 195 h.p.

### A product of HUBER-WARCO COMPANY, Marion, Ohio, U. S. A.

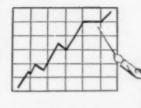
HUBER-WARCO COMPANY, Marion, Ohio, U.S.A.
Send me specifications on the Huber-Warco  50-190 ather grader models
<ul> <li>Send me the name of my nearest Huber-Warco distributor.</li> </ul>
Nema
Title
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COAL AGE . August, 1958

Designed, Engineered and Built

### to help you increase sales...





and cut operating costs

your Roberts & Schaefer Plant

You get a two-fold return on your investment in a Roberts & Schaefer coal cleaning plant.

First, a better prepared coal that will help you increase sales by satisfying the exacting needs of the markets you serve. Second, the economy of efficient operation in a modern plant specifically engineered to provide the capacity and flexibility you need.

You can be *sure* of the complete service you want from Roberts & Schaefer. Initial process studies structural, mechanical and electrical design—installation and construction.

Call the R&S office near you when you want to discuss plans for a new plant or modernization of your present operations.



ENGINEERS & CONTRACTORS

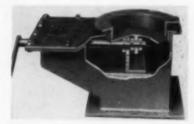
ROBERTS & SCHAEFER

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NEW YORK 19, N. Y. . PITTSBURGH 22, PA. . HUNTINGTON 10, W. VA. . ST. PAUL 1, MINN.

### Equipment News (Continued)

14.00-25 to 18.00-25. The second tire, FWT-2, is specially designed for use on front wheels of vehicles where the axle is heavily loaded and short turns with power steering are common. Goodyear notes that the tire, which is available in 10.00-20 and 10.00-22 sizes with 12-ply rating, can also be used on drive and trailer wheels for similar heavy duty.



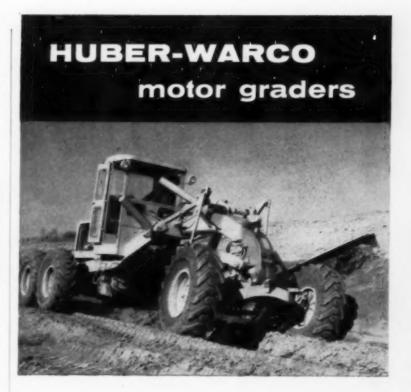
### Slide Gate Valve

Ducon Co., Inc., Mineola, N.Y., has designed a new type of slide gate suitable for use as an unloading and shut-off valve for all dry free-flowing products, such as dust, grains, etc. In operation, the round gate slides under the inlet opening and is raised by an eccentric cam to seal the opening tightly. The advantages claimed are: (1) positive gas and dust-tight seal, (2) absolutely non-sticking because of free sliding action, (3) one-handle control, (4) and gate mechanism completely out of the flow path when valve is open.



### Grease Sticks Better

The photo shows a 1,000,000-lb dragline. On one of its cams engineers placed 10 lb of regular grease and on another 10 lb of Keystone No. 30B Heavy, a new high-tenacity grease made by Keystone Lubricating Co., Philadelphia, Pa. The dragline mined for three days and then walked 1/4 mi to a new location. The company reported that the cam with the regular grease needed constant attention and 40 lb more grease during the move, while the cam with the new grease needed no attention or regreasing. This test, says Keystone Co., proves that high-film strength of No. 30B Heavy makes it an extremely tough,



### makes quick work of tough grading

Huber-Warco torque converter MOTOR GRADERS ranging in horse-power from 102 to 195 h.p., have been designed to efficiently handle tough haul road grading assignments. The perfect balance of weight and power permits these graders to move more volume with faster passes and smoother cuts for more profitable operation. A tail-shaft governor maintains speed regardless of load conditions . . . the power-shift transmission eliminates shifting operations. An exclusive feature of Huber-Warco MOTOR GRADERS is the completely cab-controlled hydraulic blade movement. In less than a minute, and without ever leaving the cab, the operator can move the blade from a 90° bank sloping position on one side to 90° on the other. There are NO manual adjustments to be made. In addition to the torque converter models, Huber-Warco also has a line of standard transmission graders from 75 to 123 h.p. Get all the important facts . . . contact your Huber-Warco distributor today.

A product of HUBER-WARCO COMPANY, Marion, Ohio, U. S. A.

HUBER-WARCO COMPANY, Marion, Ohio, U.S.A. Send specifications on Huber-Warco motor graders.  to travel to the name of my nearest Huber-Warco distributor.
Name



COAL AGE . August, 1958

### Equipment News (Continued)

water-repellant grease that stands up better under high cam pressure.



### For Control of Fluids

A new diaphragm control valve, operated by air, is said to give precise control of hard-to-handle fluids such as slurries, sludges and acids. Uniflow Valve Corp., Cranford, N. J., makes the valve, Type 900, that permits control of very small flows and has an extremely low Cv. The valve, says the firm, will control anything that can be pumped up to 400 F and 150 psi without plugging.

### Reduce Shank Breakage

Mining machine bits designed to reduce shank breakage in standard bit blocks are announced by Kennametal, Inc., Bedford, Pa. Shanks of the new bits have a short rib along each side behind the knockout shoulder. These two ribs produce a cylindrical section of <sup>13</sup>/<sub>10</sub> in in diameter and 1<sup>14</sup>/<sub>4</sub> in long in the shank, where stresses are greatest. These bits, identified as U7B, do not replace standard Kennametal U7 bits and differ from recently announced Kennametal U3 heavy-duty bits which require special bit blocks. Kennametal offers two styles of the new bit, the U7RB with recessed tip and the U7RAB with cylindrical plug tip.

### One-Piece Vibrator

A new one-piece bin and hopper pneumatic vibrator is available from National Air Vibrator Co., Cleveland, Ohio. According to the manufacturer, the Navco one-piece design has no body assembly bolts to shear or stretch, eliminates housing springs that cause replacement and has an integral striking plate that can't separate and leak air. Pistons are not grooved and can't collect pipe scale and oil emulsions, it is asserted. The firm states that its air vibrators can be used under conditions where other vibration methods are inadequate, such as hazardous atmospheres, extreme moisture, outside applications in inclement weather and magnetic-dust locations, These vibrators are made with five different piston sizes from 1% to 4 in for a variety of bin, hopper, chute, railroad car and batching applications.

### Recover Roof Bolts

Templeton-Kenly & Co., Broadview, Ill., has added a new roof-bolt-recovery jack to its line of mining jacks. The manufacturer reports that with this new jack it is very easy to recover roof bolts. Two men, it is asserted, can take out 350 bolts per day by using it as follows: Place a jack alongside each of the first row of bolts closest to the face. Raise it to the roof to provide temporary support. Remove bolts by auger of pneumatic tool. Stand 25 ft or more away and pull on a rope attached to the jack trip

3

1



lever which collapses the jack. Move the jack to position under the next row of bolts and do the same thing again. Called the "Simplex" M279, the tool has a 24-in rack bar travel. It weighs only 26 lb for a 72-in minimum jack size. The column and all castings are made of strong aluminum alloy making the jack light, easy to handle and visible, states the company.



### Tooth Adds Bite

A utility dozer tooth that changes quickly and sells at a low price is now available from Young Iron Works, Seattle 4, Wash. The tooth, asserts the firm, is made of high-strength forged steel and can be mounted on the dozer blade in a matter of minutes with a simple, positive clamp. The utility tooth adapts the regular dozer blade to short land-clearing and digging jobs, resulting in a saving of time and money. Prices of the tools are from \$40 to \$295.

### Lightweight Diesel Engines

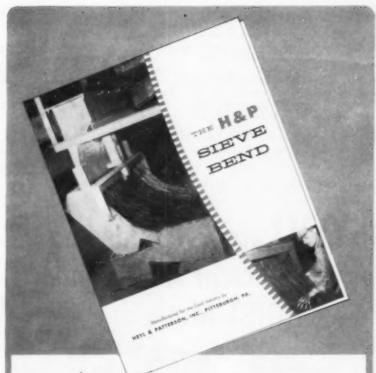
Aluminum allows are cited by General Motors as the reason why the new "71-E" truck diesels are almost 700 lb lighter than their pearest competitors in the 210-hp range. The Detroit Diesel Engine Div., Detroit 28, Mich., notes that the weight saving substantially increases payload capacity and helps contribute, along with two-cycle operation, to higher average road speeds. The new units develop a maximum torque of 577 ft-lb at 1,200 rpm and weigh 8.4 lb per hp.

### Equipment Shorts

NETWORK PROTECTOR KIT-A new three-phase network protector kit for field testing any network protector up through 480 V at 50 to 60 cycles is now available from Westinghouse Electric Corp., Pittsburgh 30, Pa. The device is arranged so that an over-all test can be made of the protector, followed by various individual checks of the component parts.

CARTRIDGE LUBRICANTS-In addi-

COAL AGE . August, 1958



here's

you should get your copy of Heyl & Patterson's newest brochure explaining and illustrating how the patented H & P SIEVE BEND can be applied successfully in your Coal Preparation Plant.

This brochure is replete with facts, tables, flow sheets and other valuable data. Return the coupon and receive complete information about the simplicity of design and operation, also the large capacity and all other advantages of the H & P Sieve Bend.

Heyl & Patterson INC.

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HEYL & PATTERSON, INC., 55 Fort Pitt Blvd., Pittsburgh 22, Pa. Please send me my copy of the H & P Sieve Bend Brochure 558.

Address

City and State

### Equipment News (Continued)

tion to the conventional pails and drums, D-A open-gear and lithium lubricants now come in cartridges, states the manufacturer, D-A Lubricant Co., Inc., Indianapolis, Ind. Advantages of the cartridge are said to be elimination of waste, time savings in loading and use, and protection from dirt contamination. The lithium cartridge can be used in any standard grease gun, and the opengear cartridge in any standard calking

BELT SWITCH-Jabco, Inc., Ebens-

burg, Pa., offers a rugged, pull-cord-type belt-circuit control switch, No. 1002. The 5x74x94-in 12-lb switch is said to feature: (1) control mechanism mounted on outside of contactor box for ease of access, (2) pull cord operating three position, on-off-idle, (3) safety lock-out when switch is in the off position, (4) adjustable tension control, (5) and lever on box for hand control.

CARBON BRUSH HOLDERS-A new brush holder consisting of a one-piece die casting and coiled spring is said to eliminate the need for periodic adjustment, reduce sparking, and minimize collector ring wear according to its maker, General Electric Co.'s Large Motor & Generator Dept., Schenectady, N.Y. Other features include constant pressure and uniformity of wear, longer wearing length, great ease of replacement and ability to replace the old pin-adjusting holders in both AC and DC motors and generators.

POWER GENERATORS-A completely weatherized 35-kw generating set has been announced by Allis Chalmers Mfg. Co., Milwaukee 1, Wis. The "G-226" is complete as a package and can be used either for standby power or as a main power source. The unit, driven by the Power-Crater engine, which can burn either gas or gasoline, is 68x26x37

BODY CHAIN REPAIR LINKS-Designed to meet and exceed the minimum breaking requirements of alloy chain, the ACCO links, made by American Chain & Cable Co., Inc., York, Pa., are easily assembled and disassembled without the use of special tools or skills. ACCO links are available in 14-, 16-, 1/4-, %. and %-in sizes, for loads from 3,250 to 23,000 lb.

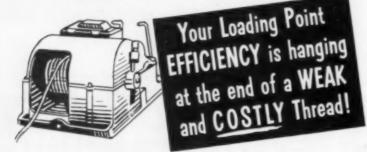
LOCOMOTIVE BRAKES - Dynamic braking with the locomotive motors, standard air brakes, a special electromagnetic brake and manual parking brakes approximately double the braking effort of two tandem 27-ton locomotives used for hauling ore down a steep grade. Although specially built for a customer by General Electric's Locomotive & Car Equipment Dept., Erie, Pa., the extra braking effort and added safety can be built into most old or new locomotives, GE states.

TRIPLE-ACTION PARTS CLEANER -Combining solvent, penetrant and detergent actions into one cleaner is the claim Pennsylvania Refining Co., Cleveland 4, Ohio, makes for its "S-P-D" parts cleaner. The company states that, in addition to the fastest possible cleaning action, SPD has little odor, longer life, will not rust, corrode or leak out of the container, and is nonexplosive and nonflammable.

WELDING ELECTRODES - Lukens Steel Co., Philadelphia, Pa., has brought out its own line of welding electrodes, noting that it is the first steel-maker to offer both its own range of plates and its own line of electrodes made to its specifications. The new "Plate-Mate" catalog keys each classification of electrode to the ASTM specification number of each type of steel plate, for selection

RETAINING RING KIT-Cited as new in the industry, this kit of 376 cadmium

### If YOU are STILL loading by the Ancient ROPE-and-HOIST Method...



### There's a BETTER and LESS EXPENSIVE WAY of LOADING COAL . . . with STAMLER CAR SPOTTERS!

Fou can't afford to be efficient at the face and lose money at your load-You can't afford to be efficient at the local state of the PAYS FOR of the mine! So why not have modern barney equipment that PAYS FOR ITSELF in a short time? Why not install the equipment that will load the MOST coal for you at the LEAST cost? That means STAMLER Car Spotters. STAMLERS get the coal out faster, more efficiently, and at less cost

than by ANY OTHER METHOD. And with smooth-running hydraulic STAMLERS parts replacement costs are not even worth mentioning. We can PROVE to you that STAMLERS will pay for themselves in a short time!



SCHROEDER BROTHERS, Exclusive Eastern Sales Agent UNION INDUSTRIAL CORP., Corlsbod, New Mexico

### W. R. STAMLER CORPORATION

PARIS, KENTUCKY

SALMON & CO., Birmingham, Alabama WESTERN SALES ENGINEERING CO., Solt Lake City, Utoh

plated Truare retaining rings is offered by Bearings, Inc., Cleveland 15, Ohio. The rings, which meet the National Aircraft Standards, NAS 669 and NAS 670, come in sizes from ¼ to 2½ in. It is said that the ring-kit sizes and designs represent approximately 70% of the retaining-ring sizes now used in industry.

STAINLESS STEEL ELECTRODES—According to Air Reduction Sales Co., N.Y. 17, N.Y., the "Easyarc" 308, 316 and 347 electrodes are the first powdered-metal stainless units ever offered. Benefits claimed for these AC-DC electrodes are: (1) unprecedented footage per electrode, (2) well-formed beads, (3) smooth, uniform operation, (4) and excellent restriking characteristics.

LIGHTWEIGHT JACKHAMMER—Although the new J-30A Jackhammer has most of its working parts interchangeable with the older J-30 model, it still offers new features such as: (1) blower valve incorporated into the throttle valve; (2) casy conversion from the standard blower styles to plain dry or wet styles; (3) all drill-steel-centralizer working parts enclosed within the fronthead; (4) special inner coating which prevents rust and helps the "break-in." The manufacturer, Ingersoll-Rand, N.Y. 4, N.Y., cites no increase in price over the J-30 model.

### Free Bulletins

TREAD MOUNTED LOADERS—Information about Goodman 900-series tread-mounted loaders is contained in Catalog G-134 from Goodman Mfg. Co., Halstead St. and 48th Place, Chicago 9, Ill. The features and dimensions of the AC or DC 965 and 966 loaders are shown.

CONVEYOR BELT IDLERS-Permaseal idlers, which are said to minimize maintenance and lubrication, are featured in 8-p Bulletin 925 from Jeffrey Mfg. Co., Columbus 16, Ohio. Drawings, photographs and detailed exposition are included.

ROCK DRILL LUBRICANTS - D-A Lubricant Co., Inc., Indianapolis 23, Ind., offers a folder describing two rock drill lubricants. The first is made for all rock drills, while the second is made primarily for Joy TM500 rock drills.

BLASTING COST-Atlas Powder Co., Wilmington 99, Del., has published two booklets and a chart in file folder form to help the explosives user compute and analyze his true excavating costs. The "Blasting Cost Control Manual" discusses Better Performance
Fast Production
Uniform Results
Maximum Bit Life

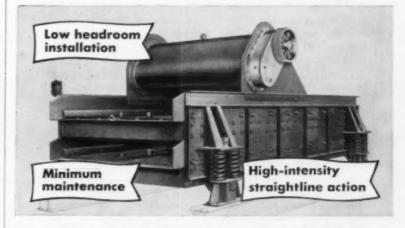
WRITE TODAY for fully descriptive bulletin! These are a few of the many advantages you get when you grind your bits automatically on the FAIRVIEW BIT GRINDER.

All of these advantages boil down to savings of both labor and wheels, productivity of 250 to 350 per hour, correct angles—smooth finish, more regrinds, more grinds per bit, more tons per grind and elimination of hazardous operation. It's to your advantage to use the FAIR-VIEW BIT GRINDER both in the satisfactory grinding results obtained and in the protection of your investment in expensive equipment.

### FAIRVIEW BIT COMPANY

FAIRVIEW, WEST VIRGINIA

### NEW LINK-BELT STRAIGHTLINE horizontal vibrating screens



For dewatering, washing and sizing of materials— Link-Belt Straightline horizontal vibrating screens assure maximum capacity for size of screen cloth.

A centrifugal force, unbalanced shaft vibrator produces the high-intensity motion necessary for efficient separation. Suspension or floor mounted, these lower profile units can be installed in locations where headroom is limited. To learn more about the benefits of horizontal screening, call or write your nearest Link-Belt office.

### LINK BELT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago I. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Soo Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

### Equipment News (Continued)

the techniques of computing and controlling excavating costs. The second booklet gives detailed instructions for using the chart. Space is provided on the chart for data and cost calculations of a blasting operation.

HYDRAULIC PUMPS—Bulletin M5108 from Vickers, Inc., Detroit 32, Mich., describes its new line of high-performance balanced vane pumps, which operate at speeds up to 2,000 rpm and pressures to 2,000 psi. These pumps offer increased power, savings in space and

weight and long life, in six capacities from 17.8 to 43.0 gpm.

SLING CHAINS—Accoloy Kuplex sling chains, made by American Chain & Cable Co., Inc., York, Pa., are described with specifications in 8-p Bulletin DH-39. The bulletin contains comprehensive data on selecting the proper chain sizes.

RAPID COUPLINGS—Cutaway drawings highlight the new general catalog of quick-connect, quick-disconnect couplings made by Snap-Tite, Inc., Union City, Pa. The five basic Snap-Tite couplings for a variety of conditions are

described in detail including information on how to order them.

BELT CLEANER AND BELT CAR-RIER – Two bulletins for conveyor operators can be obtained from Stephens-Adamson Mfg. Co., Aurora, Ill. Conveyor Belt Carrier Bulletin 355 features comprehensive technical data on a variety of S-A carriers. Belt Cleaner Bulletin 258 reports advantages of S-A belt cleaner in extending belt life and increasing operating economy.

INDUSTRIAL CHANGEROOMS — Moore Co., 1036 Quarrier St., Charleston, W. Va., describes a new concept in the modular design of changerooms in their Lockerbasket Modular Changeroom booklet. The design employs chain operated lockerbaskets for overhead storage of clothes and personal effects.

WIRE INSULATION—Available from National Electric Products Corp., 2 Gateway Center, Pittsburgh, Pa., is a comprehensive booklet on specially-compounded butyl-rubber insulation material, Nepcozone. The booklet contains chemical and manufacturing information about the insulation, in addition to charts and tables specifying complete technical data.

BIN LEVEL INDICATORS – Photographs, drawings, specifications, dimensions and applications of two types of bin level indicators and of one bin flow aerator are included in a catalog from Pin-Dicator Co., 13946-62 Kercheval Ave., Detroit 15, Mich.

CONTROL VALVES – Newly issued Catalog 1553A50 covers Parker VDSP5 series hydraulic directional control valves having nominal rating of 65 gpm. Write Parker Hydraulics Div., Parker-Hannifin Corp., 17325 Euclid Ave., Cleveland 12, Ohio.

SPIRAL RAKE THICKENER-Denver Equipment Co., P.O. Box 5268, Denver 17, Colo., offers 8-p Bulletin T5-B6 covering its improved spiral rake thickener. Dimensions, features and specifications for units up to 150 ft in diameter are given.

FLEXIBLE COUPLINGS—New additions to its line of "Sure-Flex" couplings are included in an 8-p bulletin, No. 10100A, from T. B. Wood's Sons Co., Chambersburg, Pa. Selection data and engineering tables are included.

CONVEYOR BELT HELP-A handy, pocket-sized slide card offered by the Mechanical Goods Div., U.S. Rubber Co., Passaic, N.J., helps locate the twenty headaches most frequently encountered by conveyor belt users. It also lists specific cures.

# How to keep customers happy— all winter long



Treat all shipments with Sterling Rock Salt, and your customers will be able to unload coal fast even in freezing weather. They won't have to thaw your cars or loosen coal by hand. Customers will gladly pay the small premium for coal that is treated so it won't freeze up! You can apply Sterling Rock Salt quickly, too. Just three or four bags of this effective anti-freeze agent will keep an entire carload of coal from freezing! (It takes only 5 lbs. of Sterling Rock Salt to protect one ton of bituminous; 5-8 lbs. for anthracite.)

You can also use Sterling Rock Salt to prevent frozen scales and switches... to keep roads and yards clear throughout the winter. It removes snow and ice fast. In bulk carloads or 100-lb. bags, regular or Inhibium-treated to prevent corrosion of metal equipment.

Free folder gives further information on Sterling Rock Salt for mines, collieries. Ask your Sterling representative or write to INTERNATIONAL SALT COMPANY, INC., DEPARTMENT CA-858, SCRANTON, PA.

### SALES OFFICES:

Atlanta, Ga. Baltimore, Ma. Beston, Mass. Buffalo, N. Y. Chicago, III. Cincinnati, Shio Cleveland, Shio Datroit, Mich. Memphis, Tenn. Newark, N. J. New Orleans, La. New York, N. Y.

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STERLING ROCK SALT

### BUILT-IN ASSURANCE

### To Help Make Your Plans Work As Specifie

### F-M WESTCO PERIPHERAL PUMPS

### F-M BUILTOGETHER CENTRIFUGAL PUMPS

hat and cold liquids liquid circulation low-viscosity liquids bailer feed cooling towers, etc.



Up to 900 gpm., pressures to 525 ft. Closecoupled pump and motor units mount horizontal, vertical or angular. Sizes 3/4" through 5".

#### F-M NON-CLOG PUMPS

plant waste slurries paper stock fruit fish vegetables, etc.



Up to 30,000 gpm., pressures to 175 ft. Sizes 2" through 20". Vertical or horizontal. Bladeless or conventional.

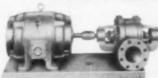
### F-M SPLIT-CASE CENTRIFUGAL PUMPS

water supply; plant service booster; circulating air conditioning refrigeration chemical liquids boiler feeds, etc.



Up to 50,000 gpm., pressures to 700 ft. Sizes 11/2" through 36". Single stage or multistage.

> For full information about Fairbanks-Morse pumps, call your F.M Sales Engineer or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.



condensate return hot and cold liquids chemicals refrigerants, etc.

Up to 200 gpm., pressures to 900 ft. High pressure at normal operating speeds. Handle widely varying heads with little change in capacity. Sizes 11/4" through 21/4".

The best-laid plans can go astray when mechanical equipment fails to deliver according to expectations or fails to give sustained peak performance. That's why Fairbanks-Morse builds something extra into all pumps so your plans work as specified.

### F-M Pumps You Can Rely Upon

Full-rated capacity guaranteed...with built-in safety margin to assure maximum efficiency under most severe use. Rugged, durable, precision-made to maintain efficiency with mini-

### Expert Help When You Want It

F-M Engineers are ready to work with you on any of your pump problems.

### -M END-SUCTION PUMPS



hot and cold liquids chemicals circulating liquids low-viscosity liquids cooling towers condenser circulation, etc.

Up to 100,000 gpm., pressures to 250 ft. Sizes 3/4" through 54". Horizontal or vertical.

a name worth remembering when you want the BEST

PUMPS . SCALES . DIESEL LOCOMOTIVES AND ENGINES . ELECTRICAL MACHINERY RAIL CARS . HOME WATER SERVICE EQUIPMENT . MAGNETOS

### Among the Manufacturers

### Atlas Elects Officers

Ralph K. Gottshall has been elected chairman of the board and president of Atlas Powder Co., Wilmington, Del.

As chairman, Mr. Gottshall succeeds Isaac Fogg, who retired Aug. 1 after nearly 46 yr of service. Mr. Fogg remains a director of the company. The board also announced the election of Edward J. Goett to the position of executive

vice president. Mr. Gottshall joined Atlas in 1927. He was elected president in 1953.

At the same time it was announced that William C. Lytle has been elected vice president in charge of the explosives division of the company.

### Foreign Subsidiary

A wholly-owned foreign subsidiary of the Joy Mfg. Co., Pittsburgh, Pa., bas been formed to better promote the parent company's overseas activities.

Called Joy International, S.A., the new organization will develop Joy sales, render technical advice and service to customers and furnish advisory and consulting services to the parent company and its affiliates—all of this in or related to foreign markets. William L. Wearly is chairman of the new subsidiary, and Harold R. Wheeler is president.

### New Plant

Chain Belt Co., Milwaukee, Wis., has acquired 92 acres of land in Madison, Ind., for a new plant site.

The company, a producer of conveyors, mechanical power transmission machinery and other industrial equipment, expects to construct a plant for making its heavy machinery lines on the site. The location was chosen because of its transportation facilities and central location in relation to certain markets.

Russel E. Story has been appointed manager of Bucyrus-Erie Co. of Canada, Ltd., Guelph, Ont., a subsidiary of Bucyrus-Erie Co.

Mr. Story, a Princeton graduate in mechanical engineering, joined Bucyrus-Erie in 1947 as an apprentice. A World War II veteran, he was manager of the Chicago works and then an assistant to the manufacturing manager at the S. Milwaukee works before assuming his present position.



A new office of the Bird Machine Co., S. Walpole, Mass., is located at 1 Cedar Blvd., Pittsburgh, Pa.

The office, headed by William S. Hollins (above) was established to provide more prompt and effective sales and service engineering for Pennsyl-

NEW SPEED AND DRILLING ECONOMY WITH THE NEW IMPROVED

# Parmanco MODEL CD-51-57

COAL AND CLAY DRII



- Augers Rotated by Vickers 21.5 H.P. Fluid Motor with Hydraulic Feed Finger Tip Controlled
- Cutting Shield And Guide Completely Automatic
- . Drill Powered By 65 H.P. Water Cooled Motor.

Jack Foehrer, Pit Foreman says

"THE PARIS DRILL IS THE BEST WE HAVE EVER USED."

SEND FOR COMPLETE DETAILS

PARIS MANUFACTURING CO.

PARIS, ILLINOIS

vania, Virginia and West Virginia preparation plants.

Frank J. Strnad succeeds Harold F. Allen, who is retiring, as chief engineer of Link-Belt Speeder Corp., subsidiary of Link-Belt Co.

Mr. Strnad came to the parent company in 1934, and to Link-Belt Speeder in 1945 as the subsidiary's hydraulic engineer. He became assistant chief engineer in 1950. Mr. Allen, who was with the company for 42 yr, has several outstanding equipment developments to his credit.

An expansion of the field sales and services organization of its technical products division has been made by Mine Safety Appliances Co.

A newly organized field staff comprised of instrument and ventilation specialists is prepared to assist and advise in the design, installation and maintenance of instruments and process controls for a variety of industries.

Allis-Chalmers Mfg. Co. has announced the creation of several new positions in order to expand the scope of its sales promotion.

Charles W. Parker Jr. has been named director of sales promotion in A-C Industries divisions. A. R. Tofte is the new manager of publications and industrial press department, and J. W. Murphy is the manager of the new advertising department. The new positions will help A-C sales promotion keep pace with company growth.

Merrill E. Pratt, president of Continental Gin Co. since 1938, has been made chairman of the board by the directors of the company.

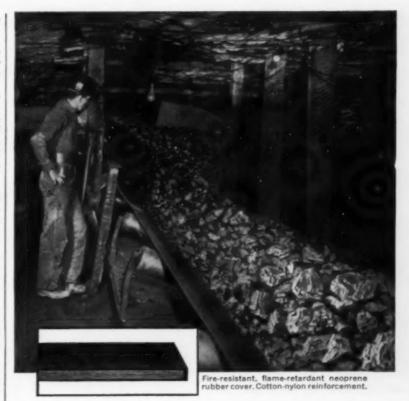
Eugene H. Brooks steps up to assume the presidency and the chief executive position, while Richard T. Dorsey is the new vice-president in charge of the gin division. Mr. Pratt has served in various capacities with Continental Gin since 1916.

Caterpillar Tractor Co. has announced the promotion of three executives.

Vice-president Gail E. Spain moves up to become president of Caterpillar's foreign trade group. J. R. Munro, director of manufacturing for foreign operations, is a new vice-president. Also assuming a vice-presidency is W. K. Cox, manager of sales promotion.

To extend its services to customers, Reliance Electric and Engineering Co., of Cleveland, Ohio, has created two new management positions in the marketing division.

E. L. Bronold becomes sales manager of apparatus sales and C. P. Packard is now sales policy manager in the marketing services department, both with headquarters in Cleveland.



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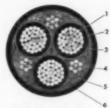
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(Continued on pages 169, 170, 171)

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500"—36" Joy Limberolier Belt Conveyor complete
2,000"—36" Joy Belt Conveyor, Complete
2,000"—36" Barber Gress Belt Conveyor, Like Now
2—1000" and Vortree, Belt, Eb.
5,000"—36" Barber Gress Belt, Eb.
5,000"—36" Barber Gress Belt, Eb.
5,000"—36" Barber Gress Belt, Eb.
5,000"—36" Jeffray 52B Belt Conveyor
160"—36" Jeffray Jeffray
160"—36" Jeffray
1

2—FTIS Lang Flaggasak Conveyor CUTTING MACHINES 4—7AU Track Mtd. Sullivans 2—78 Sullivans, 35 & 50 h.s. 8—12AS & 12 AA Standard Goodmans 3—12AA Universal Goodmans 4—212AA Baby Goodmans, 230 446 V.

3—512 Goodmans, w/Bugdusters 1—712 Goodman 1—624 Goodman, 42" f.g. 1—529 Jeffroy, 230 Voit 1—299 Jeffroy, 220/460 Voit, AC Track Mounted 5—538 & 358 Jeffroys, AC & DC, Bugdusters & Tracks Available

Tracks Available
LOCOMOTIVES
2—30 Ton SMH77 Joffreys, 42" t.8.
2—30 Ton SMH77 Joffreys, 42" t.8.
3—13 Ton Lecomotives, 230 Volt, any sause
5—10 Ton Lecomotives, 230 Volt, any sause
t.—3 You Joffrey
1—6 Ton Sattary Lecomotive—New
51—6 Ton Lecomotives, any sause
6—8 Ton Lecomotives, any sause
1—5 Ton Lecomotives, 23" overall
1—5 Ton Lecomotive, 230 Volt
1—5 Ton Lecomotive, 230 Volt
1—7 Ton Lecomotive, 230 Volt
1—7 Ton Lecomotive, 230 Volt
1—7 Ton Lecomotive, 230 Volt
1—5 Ton Lecomotive, 230 Volt
1—7 Ton Le

I--J Ton Locomotive, 200 Volt
SUB STATIONS & TRANSFORMERS

I--75K W Bode Diesel, w /250 Volt Generator

I--108K W Bode Diesel, w /250 Volt Generator

I--108K W Bode Diesel, w /250 Volt Generator

I--108K W Bode Diesel, w /250 Volt Generator

DE Generator

I--158K W Retary Converter—Completely Automatic

I--158K W MG Sets of various makes and primary voltage.

12--136KW MG mets of various well as well as a construction of KW, GE TCCS, 2300/4800 Velt Botary Convertors
4--206KW MG MG Set
3--Armatures for 158 & 280KW Ristary
3--406 & 806KW Auto Transformers
106--Transformers of xerieus sizes

2—464 & SURLEW Auts Transformers

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T-Compiste Tigales, including Cleaning Plant,
Conveyors, Crushera, Sira, Ets.

--American Air Tables for Stoker and Carbon

1-4 Coll Jeffrey Stown Jig Washer and Carbon

1-4 Coll Jeffrey Stown Jig Washer

BARGAIN PRICE

1-4 Carbon Proyr-Gengliste

1-4 Soft Pas Stogel Bull Crusher

1-3 Soft Passis Rull Crusher

1-3 Soft Passis Rull Crusher

1-3 Soft Jeffrey Finatoria Crusher

1-4 Soft Jeffrey Single Rell Crusher

1-5 1 Soft Jeffrey Finatoria Crusher

1-5 1 Soft Jeffrey Finatoria Crusher

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1-5 1 Sowned Bull Crusher

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Seraper Conveyors of various sizes
 Tipple Boils from 15" to 42" width and various lengths
 Leading Booms with Holsts
 Air Valves, Blowers, Pumps, New Servons, Parts for CBI Dryers, Speed Reducers, Feeders & Many other parts for Tipple Equipment.

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39-30" t.g. Drop Bettom Care 233-42" t.g. End Dump Care, Various makes and

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50.000"—4.0 Rubber Covered & Insulated Capper

12.000"—40 Trollay Wire

50.000"—2.0 Selida Capper Trans. Line

20.5500"—2.2 Selida Capper Trans. Line

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MISCELLANEOUS

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1-100 h.p. Single Drum Hoist

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2—300 h.p. Motors
564—Battleany Meters: ½ to 300 h.p. of various inpecifications
1—1200 GPM Cent. Pump
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2—000 GPM Cent. Pump
2—000 GPM Cent. Pump
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2—Jay 14-8U Looders, modium pedestal, 788E.  2-Jay 12-8U Looders, 9E, lotest type.  1-Jay 12-8U Looders, 220 volt AC.  1-Jay 12-8U Looders, 120 volt AC.  1-Jay 11-8U Looder, lotest type.  1-Jay 11-8U Looders, 125 volt DC.  1-Jay 8-8U Looders, 250 volt DC.  1-Jay 8-8U Looders, 270 volt AC.  1-Jay 8-8U Looders, 270 volt AC.  1-Jay curved Bor Head, complete.  6-Reliance 38-J Motors, 719 H.P.  6-Reliance 10-J Mators, 719 H.P.
2—Juy 14-8U Loodors, modium pedestal, 788E.  2-Juy 12-8U Looders, 9E, lutest type.  1-Juy 12-8U Looders, 220 volt AC.  1-Juy 12-8U Looder, 220 volt AC.  1-Juy 11-8U Looder, lutest type.  1-Juy 11-8U Looder, lutest type.  1-Juy 8-8U Looder, 250 volt DC.  1-Juy 8-8U Looder, 250 volt DC.  1-Juy 8-8U Looder, 270 volt AC.  1-Juy curved Bor Head, complete.  6-Reliance 38-J Moters, 10 H.P.  6-Reliance 34-J Maters, 17 H.P.  6-Reliance 10-J Maters, 5 H.P.
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1. Jan 7.8 Custing Muching like new 260
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2-Jay 7-8 Cutting Machines, 220/440 volt AC.
1 Our door Marking on Cate 21" bick All
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head, cuts anywhere in seam, 38" high, on
cors, 250 voit DC.
ters, 230 von DC.
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3-Jeffrey 13 ten, type MH-110, 36", 42" and
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2-Jeffrey 10 ton, type MH-110, 42" and 44"

- frey 10 ton, type MH-110, 42" and 44
- 2-Juffrey 10 ton, type mirror, G. G. G. L-Juffrey MH-124, 6 ton, 24" overall height. 12-Juffrey, 6 ton, type MH-88, 42", 44" and 46" Go. 2-Juffrey, 8 ton, type MH-100, 2" armor plate
- 2-Jeffrey, 8 ton, type MH-100, 2" armor plate frames.

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  3-Jeffrey, 6 ton, type MH-96, 42", 44" and 48" Ga.

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  1-G.E., 8 ten, type 822 Locametive, 42", 44" and 48" Ga.

  3-G.E., 10 ton, type 809 Locametive, 42", 44" and 48" Ga.

  3-Goodman, type 33, 6 ton, 44" and 48" Ga.

  3-Goodman, 8 ton, type 32A, 36", 44" and 48" Ga.

  3-Westinghouse, type 902, 4 ton, 42" and 48" Ga.

- 2-Westinghouse, type 904, 6 ten, 44" and 48" Ge.
  2-Westinghouse, type 906, 44" and 48" Ge.
  2-Westinghouse, type 907, 10 ton, 44" and
  48" Ge.
  8-Jeffrey MH-78 Locomotive Units, cheep.

- LOCOMOTIVES (Cont.)
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  4-Jeffrey MH-88 Locometive Units, reel ber-
- gains. 6-Jeffrey MH-100 Locometive Units, reason-
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  --Joy 108U, robber tired, Cutter.

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  --Joseffrey 29UC Universal Machines on Cats.

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  --Boby Goodman 212, robuilt, 250 volt DC.

  --Boby Goodman 212, robuilt, 250 volt DC.

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  --Juffrey 35-L Carring Machines, 220/440 volt AC.

  --Jug 7-8 Cutting Machines, robuilt.

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  2-Goodman 224 Slabbers.
  2-Goodman 234 Slabbers.
  2-Geodman 234 Slabbers.
  2-Jeffrey 331's, like now, 17" high.
  2-Jeffrey 331's, on low voin trucks.
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  13-Jeffrey 338, 250 volv AC.
  13-Jeffrey 298's on truck.
  2-Jeffrey 298's on truck.
  2-Jeffrey 298's on truck, perfect.
  2-Sullivan C8-10's, 13" high.

- LOADING MACHINES
- 16-Loaders, all types: 2-Jeffrey 61 CLR's an rubbor, 26". 3-Jeffrey 1-500 Loaders. 2-Myers Whaley No. 3 Automat Loaders. 2-Clarkson Loaders, 26" above rail.
- CONVEYORS 1-Joffrey 52-8, 30" Conveyor, 1000'. Excel-
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  Excellent.

- Excellant.

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   Robins 30" Bolt Conveyor, 1000'.

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  2-61WH 15" Room Conveyors, 300'.

  2-Joy 15" Room Conveyors, 300'.

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  1-150KW, 6 phese, Allis Chalmers Retary
  Converter, 275 velt DC, perfect.

  1-200KW, Allis Chalmers Retary Converter,
  6 phese, 275 DC, perfect.

  1-200KW, G.E. HCC-6 Retary Converter,
  775 velt DC.

  3-200KW, G.E. HCC-6 Retary Converters, 275
  DC.

- 3-300KW Westinghouse, 6 phose, Retary Converters, 273 volt DC.

  1-375KW Westinghouse Retary Converter, 275 volt DC.

  1-200KW Westinghouse Retary Converter, 275 volt DC.

  1-200KW Restinghouse Retary Converter, 275 DC.

  (all the above with 6900/13000 and/or 2300/4000 primary transformers)

  1-150KW MG Sets, General Electric and Westinghouse.
- 2-13Mr W Mrs. Set, Westinghouse, rebuilt.
  1-200KW MG Set, Westinghouse, rebuilt.
  1-200KW MG Set, General Electric, perfect.
  2-150KW Allis Chalmers MG Sets, 275 DC volt, excellent, 226-440 AC volt.
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- volt, excellent, 220-440 AC volt.

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  -500KW Westinghouse, 600 volt, DC, 6 phose, Rorary Convortors.

  -500KW HCC-6 Retery Converter, 6 phose, 600 volt DC.

  -500KW HCC-6 Retery Converter, 6 phose, 600 volt DC.

  -Cummins 125 KW, Dissel with 250 volt DC. Generator, 773 volt DC.

  1-G.M.C. Dissel Plant with 66 KW Generator, 273 volt DC.

  1-Allis Chalmers Natural Ges Engine with 1880 Generator, 273 volt DC.

  1-700 M.P. Shaff Hoist, camplete. Complete steam plant, will sell all or any port. Boilers, like new, 1100 M.P. and 500 M.P. Also transformers, tarbines, etc.

  1-Complete Tipple with Cleaning Plant.

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MISCELLANEOUS

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1—10 ton Mine Car Scale with Recorder.
15—Brown Fayro HKL and HG Car Spetters.
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1—Jeffrey 8" Aerodyne Fan.
1—Jeffrey 8" Aerodyne Fan.
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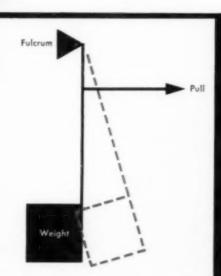
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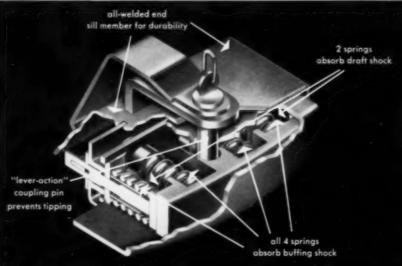
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